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Editorial Comments.

THE PORT OF STRASBOURG.

The subject of this month's Supplement, the Port of Strasbourg, where an extensive programme of new quays and railway facilities is to be embarked upon, has much in common with another European river port also on the Rhine. That is the Swiss frontier port of Basle, which came under consideration in the issue of January, 1927.

Like the latter, Strasbourg is situated many hundreds of miles from the sea, and is a centre through which a large goods traffic has to pass, both for import and export. In each case the Rhine is the only natural waterway over a very wide territory which can be utilised for this purpose. It would be necessary to go right across South-Eastern Germany to the Elbe rising in Czecho-Slovakia to find a river to compare with it. Whilst beyond Strasbourg and Basle, due east, there is nothing in Switzerland to provide a similar outlet to the sea. Even in Northern Italy there is only one river of related importance, and that is a tributary of the Rhone, which runs down to Marseilles. Yet the region to be served is a large one, and the goods to be carried great in volume and value.

That is why the regions and industries affected are so concerned with the development of their ports and river. For centuries there have been wars over the Rhine and the possession of its banks. A sidelight is recalled by a popular German song written by Becker in 1841: "They shall not have it, the free German Rhine"; and Alfred de Musset's reply in the same year: "We have had it, your German Rhine."

In the middle of last century a central navigation committee was set up for the conservancy of the river, representing Alsace Lorraine, Baden, Bavaria, Hesse, Holland and Prussia. The Rhine Irrigation Treaty was signed in 1868. After the war in 1815 France had retained the left bank, but lost it at the close of the Franco-Prussian War in 1870-71.

At Strasbourg, as at Basle, the ingenuity of harbour and river engineers has been taxed by the problem of making a channel for commerce by the improvement of the natural waterway and the addition of canals. With what success this has been done is shown in Monsieur Vever's article and by Dr. Bosshardt's earlier account of Basle, mentioned above. It is a piquant commentary on the early history of Rhine navigation that even at the end of the eighteenth century, traffic through Strasbourg from Basle was carried down-stream only by small wooden barges which had to be broken up as scrap on reaching the coast of the Low Countries.

In 1826 steamers began to make the journey from Strasbourg to the sea with both cargo and passengers, although the economic side of the latter traffic has never sustained itself against the competition of the railways, notably the Chemin de Fer de L'Est of France. River walls were built as a result of Tulla's scheme of 1840. In 1853 the Marne-Rhine Canal linked Paris and Havre with Strasbourg, and could be used by barges nearly three times as large as the old wooden ones of 100 metric tons. To-day a branch canal joins up with the coalfields of the Saar.

The Bassin de Commerce and the Port d'Austerlitz were opened in 1891-92 and Strasbourg passed from a purely canal port to a river port of international importance. Vessels now using the port include over 3,000 barges with a capacity of over 750 tons and nearly 250 tugs of from 500-2,000 h.p. In this connection Germany and Holland are the principal barge owning countries.

The present extension scheme comprises two parts. The first provides for an increase of the existing quayage from 10,600 to 22,000 metres to deal with a traffic of 6,000,000 metric tons. The cost will be 168 million francs, of which 101 millions is earmarked for harbour works and 67 million francs for railway facilities.

It is estimated that the second part of the scheme designed to meet a progressively expanded trade of 10,000,000 tons annually, will cost 79 million francs, of which 68 million will be for harbour works and 11 million francs for railway facilities. This will provide five new docks with an aggregate increase of quayage of 10,000 metres. Work and arrangements for the first part of the scheme will considerably reduce the cost of units to be added. Quays will be mainly of the sloping embankment type.

The traffic of the port in 1926 totalled 3,200,000 metric tons, the principal commodities being coal, grain, potash, ores and oil. Imports accounted for about two-thirds of the tonnage.

IMPROVEMENTS AT NEWPORT.

At Newport, in common with Cardiff and Swansea, considerable improvements in general arrangements and plant have been effected since the Great Western Railway took over the docks. Additional siding accommodation has been provided at the Monmouthshire Bank for 700 wagons; at the Mendalgief Bank for over 450 wagons; on the low level, Alexandra Dock Junction, for 700 wagons to deal with Eastern Valleys traffic; and adjacent to the General Cargo Quays, South Dock, for 300 wagons; constituting additional sidings for 2,130 more wagons. Improvements have also been effected on the dock lines.

The latest tips in the South Dock had been constructed to take 20-ton wagons, so that only minor alterations were necessary to adapt them to the bigger wagons, and tips Nos. 14-20 in this dock are capable of shipping 20-ton wagons. No. 13 tip, South Dock, could not be adapted and was therefore reconstructed. In the North Dock two tips have been adapted. Two of the tips at the Town Dock have also been reconditioned and adapted for 20-ton wagons.

In 1924 orders were placed for four new 3-ton and two new 6-ton electric luffing jib cranes, which were duly erected at the south quay, Alexandra Dock, and orders have since been given for a further seven new cranes, four of which have been erected at the South Quay, while the other three are to be placed on the East Quay, South Dock. With a view to further speeding up operations on the general cargo quays a number of electric capstans have been installed to assist in the movement of wagons.

The large building constructed by the Government during the war alongside the South Quay on an area of 13 acres has been purchased, and with rail and road access it offers convenient accommodation for the storage of general cargo. A 2-ton electric runabout crane has been added to the equipment at Sheds Nos. 6 and 7 to facilitate the movement of goods to and from the quayside cranes to warehouse. A number of grip appliances for faster and more careful shipment of tinplates have also been introduced.

A further facility for weighing long iron billets and articles of similar character, loaded in wagons of the Macau type, has been provided at Newport Docks by installing a 70-ton weighbridge. The machine consists of three separate plates, each 16 ft. in length, either two of which can be coupled together. Electric lighting has been installed throughout the Town Dock. The communication passage between the South and North Docks has been widened by the removal of the masonry invert to permit larger vessels to pass through the passage.

The Great Western Commercial Graving Dock is to be widened, to permit larger vessels to use the Dry Dock. Electric lighting has been installed and a modern pumping plant put in for draining the dry dock. An important work is to be undertaken shortly, at a cost of nearly £50,000, in the reconstruction of the timber quay at the northern portion of the east side, North Dock, in ferro-concrete.

Notes of the Month.

PORTS TRIBUNAL.

In connection with the work of the Dublin Port and Docks Board, evidence was submitted before the Ports and Harbours Tribunal sitting in Dublin during the month of June.

AERIAL ROPEWAY FOR DUBLIN.

On the recommendation of Mr. Mallagh, their engineer, the Dublin Port and Docks Board have accepted the tender of Ropeways, Ltd., for the installation of an aerial ropeway in connection with the deep water extension at the Alexandra Basin.

LOCOMOTIVE CONTRACT FROM BRAZIL.

It is announced that Sir W. G. Armstrong, Whitworth and Co., Ltd., have secured a contract for ten 4-6-2 locomotives from the Leopoldina Railway of Brazil.

These locomotives, the contract for which has been secured against keen competition, are to be completed within five months, and will be shipped to Rio de Janeiro in fully erected condition.

PILOTAGE AT SEVILLE.

His Majesty's Consul at Seville has forwarded to the Department of Overseas Trade a translation of the revised pilotage and mooring tariffs now operating at that port.

A copy of these new tariffs, together with a detailed report on the port facilities and charges likely to be incurred by vessels calling there, may be consulted by British firms upon application to the City office of the Department of Overseas Trade (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

THE SUBMARINE "OSWALD" LAUNCHED.

H.M. submarine "Oswald," the second of the five "O" Class submarines of the 1926 naval programme ordered from private contractors, was successfully launched from the naval construction works, at Barrow-in-Furness on Tuesday, June 19th. The first one, it will be remembered, was launched at the same yard last month, and the third one—H.M. Submarine "Otus"—will take the water in August.

As is often the case with submarines, the launch of the "Oswald" was of a private nature. The boat was released by Mrs. Layton, the wife of Captain Geoffrey Layton, D.S.O., Royal Navy, Deputy Director of the Operations Division at the Admiralty, who recently vacated the position of Chief Staff Officer to the Admiral of Submarines.

The "Oswald" is the 148th submarine launched from the Barrow yard.

SOUTH WALES DOCKS.

The Great Western Railway Company, in pursuance of their progressive policy, have opened a new Docks and Passenger Office at 84, Leadenhall Street, E.C.3.

The Company are the owners of the largest dock system in the world and it has been recognised for some time past that it was essential for the Docks Department to be represented in the City of London in order that shipowners, merchants and exporters should, without inconvenience or delay, be able to ascertain first-hand information relative to the Company's Docks in South Wales, etc.

The Company's Docks and Passenger Agent, Mr. E. W. Gould, will be in attendance to give full information in respect of dock dues and charges, facilities, etc., in operation at any of the Company's ports.

The principal docks of the Company are in South Wales, including Cardiff, Swansea, Newport, Barry, Port Talbot, Penarth, Fishguard, Briton Ferry, Burry Port and Llanelly, and in addition to these the Company own Plymouth Docks, the port of call for ocean liners, and also several other smaller docks.

"SCOTTISH HEATHER."

The single-screw steam oil tanker "Scottish Heather," built to the order of Tankers, Ltd., London, by Sir W. G. Armstrong, Whitworth and Co., Ltd., at their Armstrong Yard, Walker-on-Tyne, completed her official full speed trials at sea under fully loaded conditions on the 25th May with highly satisfactory results.

The vessel is built on the longitudinal system, under special survey by Lloyd's for their highest class, and has a length overall of 455 ft. with a moulded breadth of 56 ft. 8 in. and is designed to carry 10,000 tons deadweight at a speed of 11¼ knots per hour.

A special feature of the vessel is that she is fitted with the Oertz rudder instead of the ordinary type of rudder as fitted to the sister ship "Scottish Chief" delivered by Sir W. G. Armstrong, Whitworth and Co., Ltd., May, last.

The main propelling machinery manufactured by the Marine Engine Department of Sir W. G. Armstrong Whitworth and Co., Ltd., consists of a single set of inverted direct acting surface condensing quadruple expansion engine of the most modern design, and capable of developing 3,300 I.H.P., Four Babcock and Wilcox water tube boilers supply steam at a pressure of 250 lbs. per square inch with a super heat of 100 deg. Fahr., at the boiler stop valve.

White's latest type oil burning installation is fitted and the boilers are fitted with air heated fronts and designed to work with a closed duct system of forced draft.

The owners were highly satisfied with the performance of the machinery, which worked without a hitch of any kind during the trials, and the speed obtained was in excess of that guaranteed.

The owners were represented on the trials by Mr. W. A. White, director, and Mr. H. Hudson, superintendent engineer, the builders of the vessel by Mr. R. Giles (yard manager) and Mr. J. W. Gibbeson, and Mr. T. H. Matthews (manager marine engine department.)

PROPOSED MUNICIPAL LAIRAGES FOR DUBLIN.

Mr. J. F. O'Hanlon, an Independent member of Dail Eirearn, representing Cavan, is asking the Dail to say that the Government should confer with the Dublin Commissioners, the Dublin Port and Docks Boards, and the Cattle Traders' Association, with a view to the erection of municipal lairages at the North Wall, and for facilities for convenient berthage. This proposal has been made "having regard to the lack of proper facilities for the shipment of cattle from Dublin port, and the fact that the carrying trade from the Free State to British ports is practically non-competitive."

NEW ORLEANS PUBLIC BELT ISSUES $1,000,000 OF IMPROVEMENT BONDS.

Bids were opened May 21st for the sale of $1,000,000 of New Orleans Public Belt Railroad Bonds. Sale was to the highest bidder, Moore, Hyams and Company, of New Orleans, at $1,041,565, with accrued interest from April 1st, 1928, to date of delivery. These are 4½ per cent. bonds, and are a portion of an authorized issue of $5,000,000. The proceeds are to be extended for general additions and extensions to the belt line service, which serves the seven miles of public-owned wharves as well as other public and private industries of the port and connects such industries with all railroads entering New Orleans.

There were eleven bids submitted for these bonds, representing thirty-four financial houses of New Orleans, Chicago, St. Louis, New York, Shreveport, Birmingham, etc. The successful bidders represented R. M. Grant and Co., of Chicago; Liberty Central Trust Co., of St. Louis; H. M. Byllesby and Co., of Chicago; and Moore Hyams and Co., of New Orleans.

CANADA'S COMMERCIAL FRUIT CROP VALUED HIGHER IN 1927.

The value of the commercial fruit crop in Canada in 1927 is estimated preliminarily at $17,416,632 as compared with $15,224,570, the final total for 1926. The total production of commercial apples is estimated by the Dominion Bureau of Statistics at 2,817,000 barrels as compared with 2,954,370 barrels in 1926. Though production was down slightly from the previous year an increase in value per barrel from $3.28 to $3.65 resulted in the crop being valued higher than in the earlier year. For 1927, the value of commercial apple production is estimated preliminarily at $10,285,995 as compared with $9,688,162, the finally revised estimate for 1926.

Larger crops of pears, peaches and grapes and higher prices for each of these fruits largely contributed to the total decrease of $2,192,062 in the value of the 1927 crop as compared to 1926. The increase in the grape crop was out-standing 34,560,000 pounds valued at $1,382,400 compared with 24,000,000 pounds valued at $720,000 in 1926. The commercial peach crop is estimated at 350,080 bushels valued at $1,045,850, compared with 237,950 bushels valued at $603,658 in 1926. The pear crop is given as 335,600 bushels valued at $713,690, compared with 266,440 bushels valued at $450,840 in the previous year. Although the crop of plums and prunes was smaller at 277,150 bushels in 1927 compared with 345,800 bushels in 1926 the value increased from $450,840 to $624,922.

The cherry crop was slightly greater than in 1926 at 202,510 bushels compared with 201,640. The value shows a considerable increase at $696,875 compared with $577,040. The berry crops show comparatively little change, the strawberry and raspberry crops being somewhat larger than in the previous year, while there was a decline in the commercial harvest of other berries. For 1927 the figures are:—Strawberries, 10,206,500 quarts valued at $1,399,805; raspberries, 5,368,700 quarts valued at $772,920; other berries, 3,628,000 quarts valued at $429,300.

The Harbour Plan of Chicago.

Development of Group of South Michigan Harbours part of Scheme advocated by Independent Committee on Chicago Harbour and Port Survey.

(*Continued from page 247.*)

REGIONAL PLANNING OF PORT DEVELOPMENT.

During the time these various harbour and waterway improvements were being made the Federal Government has been the only authority which has considered them from a general point of view. The Federal Government's point of view is national, however; and quite properly so. In a way, strictly local interests have prospered as a result. Each local harbour development was made independently of the other; in a sense, some of them have been competitive.

In the early days of the history of the Chicago Region such a state of affairs was natural. Chicago was not large enough to be affected by the welfare of its neighbours or to exert much influence over their affairs, so when these improvements were initiated separately, they were made with little or no concern for their effects elsewhere. A certain amount of duplication of facilities has been the result, but also some decentralization.

It is only in recent years that the science of regional planning has come to the front, to take its place with city planning as a factor of great importance in modern life. City planners have learned that when a city has reached certain proportions it has become more than a self-contained and self-sufficient community, that it has a sphere of influence which is regional or perhaps national in extent.

This realization of the regional character of large cities has led to the gradual assumption of a regional point of view in the consideration of questions affecting the development of any important phase of city life. The adoption of this point of view makes it possible to further the tendency towards decentralization which local competition has started, and at the same time to eliminate wasteful and unnecessary duplication.

Artificial jurisdictional boundaries should bear no relation to the economic movement of goods or passengers through a region as highly developed as that around Chicago. That they do affect the situation is because the local point of view still prevails.

There has been conflict in the past when developments representing local needs have found opposed to them policies of conservation of interests of national concern. The Federal Government requires that streams such as the Chicago and Calumet rivers be kept open to lake traffic at considerable direct expense to the City of Chicago and indirect expense to individuals. Similarly, the City of Chicago has not been allowed a free hand in the execution of its programme of beautification of the lake front on account of claims that potential harbour sites were being used for other purposes.

There are numerous instances of similar conflict between state and local interests.

It is felt, therefore, that any treatment given the general question of port facilities should be regional in its scope. A regional scope of view should facilitate the adjustment of the national, state, and local interests; for a regional plan is not likely to get so far afield from any locality as to overlook or ignore its interests; yet it must reach forward and evaluate the national factors involved.

PRELIMINARY ASSUMPTIONS.

CHICAGO REGION.

It is not easy to define the boundaries of an economic region no matter what basis is used for the purpose. More or less arbitrary assumptions have to be made when it comes to fixing them definitely even though the approximate locations may be fairly clear.

This study assumes that water terminal developments in the Chicago Region should be approximately within economical trucking radius of the centre of the City of Chicago, and therefore considers an irregularly shaped area from Racine, Wisconsin, on the north to Kankakee, Illinois on the south, and from Michigan City, Indiana, on the east to Joliet and Aurora, Illinois, on the west. This area includes also all of the railroad belt lines serving the Chicago district.

LAKES-TO-THE-GULF WATERWAY.

In order to predict future port requirements with any degree of accuracy definite assumptions are required as to future water routes and their probable characteristics. As far as the Lakes-to-the-Gulf Waterway is concerned these assumptions may be made fairly easily, for the most difficult part of the improvement (from Lockport to Utica) is now under construction, and the rest of the way will undoubtedly be made to conform in general to the dimensions being provided by the State of Illinois. Therefore, it is reasonable to assume that a least depth of 9 feet will be provided between Chicago and the Gulf of Mexico, and that the least width will be 200 feet except for the canals at Chicago, and for the few locks in the canalized rivers.

It is more difficult to calculate the time element than to predict the least dimensions. The improvements now under way by the State of Illinois may take two years' time to complete; the structures remaining to be built may take as long as that after construction has been started. Some time is necessary for the acquisition of sites for structures, so that from three to four years may elapse before the improvement will be fully ready for use.

The portion of the Mississippi River between Grafton and Cairo, which will require deepening by the Federal Government to 9 feet, has not been authorized to be improved to that depth. Nothing can be done in this direction until Congress authorizes the work, and from three to four years will be required once the work has been started.

GREAT LAKES, HARBOURS AND WATERWAYS.

It seems reasonable to assume that the more important harbours on the Great Lakes, the connecting channels, and the St. Lawrence River, will be improved ultimately so as to provide depths of 25 feet, possibly of 30 feet. The Welland Canal around Niagara Falls is now being rebuilt with depths of 30 feet in the locks and 25 feet in the canal. Congress has requested an investigation of the deepening of the harbours and connecting channels, and a special joint commission appointed by the governments of the United States and Canada has recently recommended the early improvement of the St. Lawrence River.

The rebuilding of the Welland Canal is progressing favourably and should be an accomplishment by 1930. Provided funds are available, the Great Lakes harbours and channels could be deepened to 25 feet within five years' time after the work is authorized. The same is true with regard to the improvement of the St. Lawrence River; but since this is an international question, the political preliminaries may delay the project.

For this reason, it has been deemed unwise to attempt to estimate the date of completion of the St. Lawrence Waterway, or an equivalent improvement. The investigations have been made and plans prepared in such a way as to insure the provision of adequate facilities regardless of the time element.

LOCATION AND DESIGN OF WATER TERMINALS.

INTRODUCTORY.

It has been said that the supremacy of a port is largely dependent upon three factors: First, the tributary commerce, actual or potential; second, the size and accessibility of the harbour; third, the efficiency of its terminal facilities. The first factor requires a rich hinterland capable of supporting a large population and producing an excess of agricultural, mineral, or manufactured products, and is largely independent of the works of man. The other two factors, if not present in a particular place, may be provided by engineering and other works, so that if the primary requisite of a rich tributary area is available the extent to which supremacy may be attained by a port is measured by the care and thoroughness exercised in the design and layout of the harbour and its facilities.

Few ports, if any, have been built to order. In general, it is not possible to follow a set of standard specifications for the arrangement of even the important features of a port development. Three major influences seem to have guided the evolutionary processes which have characterized the growth of world ports. The first of these is best expressed by defining the fundamental purpose of a port, which is to facilitate the transfer of passengers and cargo between water and land carriers. Therefore means which will ease that transfer are much to be desired, and their attainment is the motivating influence in the layout and design of a port.

The physical conditions which must be overcome constitute the second of these major influences. They affect largely the type of construction used, perhaps the kinds of transfer facilities, and in many cases the location and arrangement of the port.

Of possible equal importance in the planning of terminal developments are the characteristics of the stream of commerce for which provision must be made. The quantity and quality of trade have a distinct bearing upon many of the problems which have to be solved. For this reason the load characteristics of a port might be considered the third important influence.

While the motivating influence in port building is the same everywhere, the other two factors are not, for investigation

shows that no two port situations are alike either as regards physical characteristics or load characteristics. For a specific problem, such as the one dealt with here, it is therefore advisable to consider various aspects of a number of situations, both abroad and in this country, which may be used to form a composite situation that will conform closely to local requirements.

EUROPEAN SEAPORTS.

Many important seaports in Europe have had the benefit of authoritative planning of their major features for at least the past twenty-five years; some of them, Liverpool, for instance, have enjoyed this advanage for a much longer period. An investigation of the more important port projects in Europe therefore gives an indication of the relative advantages and disadvantages of centralized control of port affairs and at the same time shows the effectiveness of the means employed of overcoming the various physical restrictions which tend to limit the capacity of a port.

Of the many European seaports of relative importance that might be investigated those of Bordeaux, Marseilles, Hamburg, Antwerp, London and Liverpool are sufficiently representative of a variety of conditions for present purposes. Of these, Bordeaux has an autonomous administration created by authority of the national government; Marseilles' port affairs are governed by the Chamber of Commerce, which has been in active participation in such matters since 1839 and in full control since 1898. Hamburg has the equivalent of what would be called State control in the United States; Antwerp has a department of the city government as its port authority; while London and Liverpool operate under what are known as Harbour Trusts, composed of representatives of local business interests placed in office by a special electorate.

Marseilles is the only port with its harbour on the open sea; all the others are located on rivers. Bordeaux is 62 miles inland; Hamburg 85, Antwerp 54, London 50, and Liverpool 15. Each of these river ports was located where the first land crossing was practicable, but it is curious and interesting to note that in spite of the great advance in the science of bridge building since the days when the first crude structures were thrown across these streams and determined the location of the ports, no bridges have been permitted to seaward.

The necessity of building tidal basins and locks at enormous expense at some of these ports has resulted in an intensive use of both land and water area. At Marseilles the high cost of construction of piers and breakwaters in comparatively deep water has brought about the same condition of intensive use. In a selected year the port of Marseilles had a record of 13,875 tons of cargo per acre of harbour water area compared with an average of 4,660 tons for all the European ports selected, including Hamburrg with 8,750 tons and Bordeaux with 2,900.

The bridges over the Rhine, the Elbe, the Thames and the Garonne have sufficient headroom to pass the barge traffic without opening.

Special effort has been made almost universally on the continent, and to a large extent in the modern installations in England, to develop highly efficient commercial port facilities. The extensive use of shore cranes at the pier sheds is most noteworthy, the latest examples showing as many as one crane to every 100 feet of pier. The semi-portal gantry crane seems to be the most popular type for general use, though there are many other favourites, depending upon local conditions as well as prejudices.

Inland waterway traffic is of considerable importance in most European ports, and is of such volume that special provision is made for it on rather a large scale. Marseilles has gone to great expense to facilitate the free entrance of barge traffic (which is still largely potential) to its port. At Hamburg, where the barge traffic with the interior exceeds that by rail, a considerable portion of the harbour is devoted to the service of barges exclusively, while two belt canals have been built around the ship harbour to permit the ready entrance of barges to the slips without their interfering with the movements of the larger vessels. Antwerp has no such arrangement with the result that its harbour is thoroughly congested. Universally the principle is applied of bringing the barge traffic to the ships though the barge harbour and ship harbour are widely separated.

AMERICAN SEAPORTS.

As a rule, American seaports have not been designed deliberately and built according to predetermined plans. A study of their characteristics will not give one an idea, by any direct method of reasoning, of what might be called prevailing practice on this continent with respect to the location and design of seaports. In many instances, the history of an American seaport shows that private exploitation of port facilities has not been restricted to any extent by other than economic influences. While a study of European practice can show the benefits of comprehensive port planning and building, an investigation of the American situation should give an idea of what is sound commercially.

For variety of conditions the ports of Montreal, Boston, New York, Philadelphia, Baltimore, Norfolk, New Orleans, Los Angeles, San Francisco and Seattle are sufficiently representative. By far the bulk of foreign and coastwise commerce of North America is handled through these seaports. Of these, one port has a federal administration, one an inter-state control, five have state port authorities, and three are governed by municipalities.

New Orleans, Baltimore, Philadelphia and Montreal are situated on rivers, 110, 190, 101 and 1,000 miles from the sea respectively. New York, Norfolk and Seattle are on estuaries at the mouths of rivers, and are, respectively, 16, 40 ,and 125 miles from the ocean. Boston and San Francisco are on natural bays, while Los Angeles has an artificial harbour on San Pedro Bay. It is apparent that distance from the sea is no serious handicap; but this is true only because navigation is comparatively free from interference by natural or artificial obstacles in the intervening reaches. The tendency is for the port to seek a cross-roads of land highways, for by this means transfers of cargo and extra handlings are eliminated.

In every case the entrance channels have been kept as free from obstacles as possible. Channels to the commercial ports are universally kept clear. The commercial sections of all these ten ports are seaward of all bridges except for the high bridge over the St. Lawrence River at Quebec, the high bridges between Manhattan Island and Brooklyn over the East River, and the new high bridge over the Delaware River at Philadelphia.

There is no uniformity as to size and shape of these harbours. The physical characteristics at each place have a great deal to do with the type of development followed, and consequently the shape of the harbour and the relation of land to water area. Los Angeles gets along with 1,700 acres of water surface, and does a large amount of business; New York has over 30,000 acres of water surface in its inner harbour, yet is woefully congested in places.

As previously stated, there are no low bridges over the main entrance channels leading to the harbours or between the commercial ports and the open sea. However, there are several industrial port developments between which and the open sea there are one or more low bridges. At Boston the industrial port facilities on the Charles and Mystic rivers, and on the Fort Point Channel, are all up-stream of one or more bridges; the same is true on the Passaic, Hackensack and Harlem rivers in New York Harbour, and of the Schuylkill River at Philadelphia.

Contrary to practice which is almost universal in Europe, commercial port facilities in America are relatively simple. One or two storied transit sheds with little or no equipment for handling cargo between ship and pier are all that is provided in America. Some of the more modern sheds are equipped with elevators for transferring goods between floors, and they are practically all provided with railroad connections, by one or more lines of track along the aprons of the piers, or perhaps down the centre driveways.

It is almost universally true in America that the choicest commercial piers are those nearest the commercial districts. At Montreal the transatlantic liners berth at the piers at the foot of the principal streets. In New York, Philadelphia, New Orleans, San Francisco and Seattle the situation is the same. At Boston, Baltimore, Norfolk and Los Angeles, the port developments are more largely industrial so that downtown piers are not so much in demand.

Entirely opposed to practice in handling cargo that seeks a commercial port are the means employed for handling bulk cargo. Mechanical appliances for handling coal, ore, building material, grain and other bulk goods are installed wherever there is a heavy movement of these commodities, and the equipment used is of the highest order of efficiency.

American ports, with the exception of New York, have been quite liberal in providing for physical connection of the railroads serving their hinterlands, and local switching districts as well, with the waterfront; the exception with regard to New York applies only to the piers on Manhattan Island. However, until comparatively recently the tendency was to serve one or more piers by single railroads, with little or no provision for interchange between competing piers and lines. The so-called " railroad ports " of Boston, Philadelphia, Baltimore and Norfolk operated under this sort of an arrangement for many years and it is only within the past few years that this practice has been partly broken up by the construction of publicly owned belt lines or the enforcement of switching arrangements.

Street connections to the waterfront universally suffer from lack of adequate planning of layout, size and use. Consequently congestion is the rule along the waterfronts, particularly those used for commercial port business. A commercial port development is a source of street traffic of considerable volume, and of sufficient importance to warrant special consideration in the preparation of general harbour plans.

Connections to interior waterways and the port facilities especially adapted and used for inland waterway traffic alone are " back door " affairs. They are located so as to be out of the way of the more important accommodations for ships and to keep the less expensive barge traffic from interfering with ship traffic. Where there is interchange between ships and barges, the latter universally go to the deep water facilities, alongside the ships wherever they may be; no attempt is made

to carry deep water inland to the barge terminals to permit the ships to go there for interchange.

AMERICAN RIVER PORTS.

River ports might be grouped into two general classes: first, those where facilities for handling inland waterway traffic are provided in combination with those for the service of ships, such as New York, Buffalo, Philadelphia and New Orleans; second, those which have no ship traffic and consequently are arranged solely for the service of barges and other river craft. Among the latter are St. Louis, Memphis, Pittsburg and Cincinnati. It would appear that Chicago belongs to the first class, for there will be involved in its port arrangements facilities for serving both ships and barges.

In this first class of terminals the service of ships predominates, the higher operating and investment costs of the larger carriers justifying greater attention to their requirements. In many cases terminals are designed and equipment provided for cargo handling which will answer the requirements of the ships to best advantage, and river craft are forced to accommodate themselves as best they may.

Only in recent years has an effort been made to give special service to this kind of water traffic at seaports or lakeports, and there are really only two notable examples of this tendency. At New York and at Buffalo, the State Barge Canal authorities have built special terminals for the accommodation of the barges that use the Hudson River and the state canals.

At Buffalo, for instance, an inner breakwater encloses a small barge harbour on the flank of the ship harbour, and a package freight terminal has been constructed on a pier in this inner harbour. Interchange of freight with rail and truck is amply provided for.

Elsewhere the river craft are required to utilize terminals which have been designed and located for the service of ships.

In the second class of river ports, i.e., those in the interior and not concerned with vessel traffic, the terminal facilities are found to meet the peculiarities of river craft to much better advantage. Not only have they been adjusted to the rise and fall of streams on which they are located, but special attention is being given to the best methods of getting the cargo in and out of the river craft with the least amount of damage and expense.

AMERICAN LAKEPORTS.

The characteristics of the commerce on the Great Lakes are so different from those of the trade at our seaports that it is desirable to consider them separately. Of the several hundred harbours on the Great Lakes, those of Duluth-Superior, Milwaukee, Chicago-Calumet, Cleveland, Ashtabula and Buffalo are sufficiently representative for this purpose, for the major influences at work on the traffic situation on the Great Lakes exist in large measure in one or more of these ports.

The port of Duluth-Superior is the only one of the six considered which has a naturally protected harbour basin; all the others are artificially protected entrances to streams. This explains the comparative extensive water area within the limits of this port. At the other harbours the ships of the early days sought refuge and accommmodation some distance up the streams, which were widened, deepened and straightened to some extent to permit of proper use. The entrances were first protected by piers, then by exterior breakwaters, which were subsequently extended to the shores, forming exterior anchorage basins. As the rivers became congested and land traffic increased, efforts were made to locate the more important facilities on the lake front behind the breakwaters. This tendency has resulted in the location of many of the high duty facilities at a harbour, such as ore unloaders, coal dumps and yards, on or near the lake front.

Except at Duluth-Superior, therefore, the present situation shows inner harbours on rivers, and anchorage basins outside the mouths of the streams and protected by breakwaters, parts of the protected area on the lake front being used for terminal purposes other than anchorage.

The ports on Lake Michigan have all year round navigation, but there is no inter-lake movement during the winter months.

These harbours have no serious problems resulting from fluctuation of water surface. There is no tide, and the cyclical rise and fall of the lakes, even though aggravated temporarily by seasonal and diurnal changes, is insufficient to require the use of wet docks or inclined approaches.

Fog conditions are the worst at the ports of Chicago and South Chicago, due, of course, to the immense amount of smoke which makes visibility worse than it otherwise would be. However, comparatively bad as fog conditions seem to be at the southern end of Lake Michigan, they have not prevented the extensive use of the harbours and channels there.

The traffic statistics show that the predominating movement on the lakes is of bulk cargo of which iron ore, coal, limestone, and grain comprise about 70 per cent. For this reason it is to be expected that extensive and efficient facilities for handling cargoes of this character have been provided.

No standardized mechanical cargo handling devices are employed at terminals on the Great Lakes for the transfer of package freight between ship and shore. Most of the ships in the trade are equipped with side hatches only, an arrangement which does not lend itself well to mechanical conveyance. Furthermore, the trade does not warrant special packing to resist the wear and tear of mechanical handling.

Traffic on the Great Lakes is not of such character as to produce street congestion along the water-fronts. The commodities are usually consumed where discharged, or rail and water interchange is involved. Exceptions to this are the local delivery yards at Milwaukee and Chicago, and also the building material yards where lumber, sand, gravel and stone are received by boat and distributed by truck or team.

Only two of these ports have inland waterway connections. Buffalo has the New York State Barge Canal, while Chicago has the Main Drainage Canal and the Sag Channel, both leading inland to the old Illinois and Michigan Canal, and the Illinois Waterway now under construction. The barge terminal at Buffalo is on the lake front at the mouth of the Buffalo River. It has been provided with the auxiliary protection of an inner breakwater as the outer harbour is of sufficient extent to allow any action to be produced which would interfere with, if not endanger, the service of barges at the terminal.

GENERAL PRINCIPLES.

It is apparent from the foregoing consideration of situations elsewhere which have a bearing upon the location and design of water terminals that there are three groups of influences which are of major importance. These are:

(a) Characteristics of water carriers and water routes.
(b) Load characteristics.
(c) Physical features of the terminal region.

The solution of a terminal problem along sound lines requires, therefore, a careful consideration of these three factors as applied to the locality in question.

It is no great handicap for a port to be located at some distance from the sea if the difficulties of navigation in the way of restricted channels are not too great.

It is not necessary that the harbour site be very extensive for with well arranged facilities a large volume of commerce may be handled in a comparatively limited area. A harbour site requires in the first instance protection from the open seas and from obstructive currents; secondly, ample area of sufficient depth for the anchorage of vessels awaiting dock space, quarantine service, or what not; third, area to permit the construction of shore facilities, such as piers, warehouses, storage yards, railroad yards, and rail street connections. The location selected should be capable of expansion by the addition of units for a great many years.

There should be no obstacles such as bridges between the commercial harbour and the open sea; and as few of these as possible over the entrance to the industrial harbour. These bridges should be high enough over the water to permit the passage of tugs, lighters and barges without opening.

If there is a large amount of local traffic at a port its water facilities should be located with special reference to easy pick-up and delivery. If interchange or industrial freight predominates, then at least the facilities for handling these kinds of traffic should be located where these two purposes may be served to best advantage. It is practicable to have separate terminals for each of these classes of traffic, provided some provision is made at each place for handling the others. In this way it will be practicable to serve a ship at only one berthing.

Terminals for river craft should be located where there will be no interference with the service of ships, though it should be possible for the barges and lighters to come into the ship harbour and alongside the ships to interchange cargo.

Free, unrestricted and direct interchange of freight between all kinds of land and water carriers should be provided at all major terminal developments within a port.

THE CHICAGO REGION.

GEOLOGY AND GEOGRAPHY.

The Chicago Region lies in the centre of what is known geologically as the Central Lowland, the vast basin stretching from the Appalachian Highlands to the Rocky Mountains; it is on the divide between the watershed of the St. Lawrence and Mississippi Rivers.

The topographical conditions prevailing in this region have been shaped largely by glacial action, glaciation having reached as far south as the Ozark Ridge in Southern Illinois. As the ice melted glacial lakes developed, the most noted of which in Illinois was Lake Chicago whose surface was at a height of some 60 ft. above the present level of Lake Michigan. The outlet of this lake, known as the Chicago Outlet, was by way of the Des Plaines River Valley; this formed a barrier as the waters receded, and Lake Michigan was formed.

Most of that portion of the Chicago Region with which this report is concerned is included in what is known geologically as the Lake Plain, an area that was once covered by Lake Chicago. On it are located all of the Lake Michigan cities in the region except for a stretch between Waukegan and Winnetka where the Lake Plain has been cut away by waves, leaving the so-called Lake Border Upland to form the rugged shore line of Lake Michigan.

The sand dunes, which rise to heights as great as two hundred feet along the lake front east of Gary, are also in the Lake Plain though their origin is comparatively recent.

Except for these dunes this Lake Plain is relatively flat and low, and it is characteristic of Lake Michigan that the foreshore opposite is of gentle slope, both conditions being favourable to carrying on extensive construction operations along the shore.

Several small streams drain this Lake Plain, chief among which are the Root River at Racine, Pike Creek at Kenosha, the Chicago River, the Calumet River, and Trail Creek at Michigan City. Each of these streams in its natural state is characterized by sluggish flow and low discharge.

Inland of the Lake Plain are successively what are known geologically as the Lake Border Upland, the Valparaiso Upland and the Outer Upland. These consist of a series of glacial moraines, and in the central part of the Chicago Region they are distinct from each other. The general topography of these belts of upland is characterized by parallel ridges of low relief producing a gently rolling surface.

The principal streams which drain these uplands are the Fox River, the Des Plaines River and the Kankakee River. The Fox River rises in Wisconsin some twenty-five miles above the state line, and flows south of the state line about thirty miles inland from the lake for a distance of one hundred and fifteen miles to join the Illinois River at Ottawa. It is a stream of low discharge and comparatively steep slope. It has never been improved for navigation purposes. Several water power dams have been built, forming pools which are navigated by numerous launches, but there is no commercial navigation except for excursion purposes.

The Des Plaines River rises in Kenosha County, Wisconsin, and flows south some five or ten miles to the west of Lake Michigan to a point south of Riverside where it turns southwest for about eighteen miles to Joliet, thence to its junction with the Kankakee River to form the Illinois River. Though this stream has no commercial navigation at present and its course is obstructed by boulders, narrows and rapids, it has been held by the United States Supreme Court to be a navigable stream.

The Kankakee River is largely outside the limits of the Chicago Region and is therefore worthy of mention only as one of the headwater branches of the Illinois River.

Generally the soil in the vicinity of the City of Chicago has little rock in it and bed rock is deep below the surface, making excavation simple, but heavy foundation work difficult and expensive. There are a few surface exposures but the average depth in the city has been estimated at 50 ft. with a maximum of one hundred and thirty feet. Large exposures occur along the Chicago Outlet, notably at Summit, Lemont and along the Main Drainage Canal to Lockport and at Joliet. Construction operations involving extensive excavation will be extremely expensive wherever these exposures occur.

POPULATION, AREA AND OCCUPATION.

The Chicago Region covers an area of approximately 6,800 square miles of which 600 lie in the State of Wisconsin, 4,700 in Illinois and 1,500 in Indiana. The total population in 1920 was approximately 3,800,000 of which 102,000 were in Wisconsin, 3,512,000 were in Illinois and 185,00 in Indiana. The estimated population of the region as of January 1st, 1927, was 4,600,000. About 10 per cent. of the inhabitants are rural, the remainder living in cities and villages of a population of 2,500 or over. The 1920 population densities were 170 per square mile for the portion of the region in Wisconsin, 747 for the part in Illinois, and 124 per square mile in Indiana.

Of the 500 square miles of urban area in the Chicago Region about 420 have been zoned for various purposes. A little over 25 per cent. or 112 square miles, of this zoned area has been set aside for industrial purposes though there is no information available as to how much of this is actually in use. Considering the small percentage of the area of the region occupied by cities and villages, and the still smaller amount zoned for industrial purposes, it is evident that there is room for expansion of both.

Chicago was originally built on the banks of the Chicago River and near its mouth. However, the urban growth has not been radical as the Lake Michigan shore has been a strong factor in guiding the direction of civic development. The lake has not only attracted intensive residential occupation, it has also drawn to its shore a remarkable group of industries requiring the use of its waters for either transportation or manufacturing purposes. The result is that while the urban area occupies only a small portion of the entire region, it has filled in practically solid the forty-five miles of lake front in Illinois, and large parts of the frontage in the other states as well.

The interior connecting waterways which have been improved for purposes of navigation have had a history similar to that of the lake front. With these, however, the occupation is largely commercial and industrial, though a great deal of the riparian use bears no relation to water transportation.

(*To be continued*).

Floating Dock for Abadan.

Interesting Launching at Newcastle.

The steel self-docking floating dock built by Sir W. G. Armstrong, Whitworth and Co. for British Tanker Co., Ltd., London, was launched from the Armstrong Yard on June 14th.

The principal dimensions of the dock are: Length over platforms, 194 ft.; length over pontoon, 172 ft. 11 in.; overall depth of pontoon, 5 ft. 10.; overall width, 61 ft. 3 in.; clear width between fenders, 44 ft. 6 in.; number and length of pontoons, four at 41 ft. 8 in.; space between pontoons, 2 ft. 1 in.; overall length of side walls, 152 ft. 1 in.; overall height of side walls above edge of pontoon, 19 ft. 7 in.; overall width of side wall, 6 ft. 3 in.; draft of water over keel blocks, 12 ft. 6 in.; corresponding freeboard of side walls, 3 ft. 8 in.; height of keel blocks, 3 ft.; depth of water required at site, 22 ft.; time of lift (vessels of 600 tons, 10 ft. draft), 2 hours.

The dock is of the double-sided self-docking type known as the "Sectional Pontoon." It consists of a lifting portion, formed of four similar pontoons, attached to two parallel side walls, which are continuous over their whole length.

It is capable when floating in fresh water at 36 cub. ft. per ton, of lifting and carrying a vessel displacing 750 tons, when the corners of the pontoon deck at the front edges of the side wall are level with the surface of the water. It may be sunk to a depth over keel blocks of 12 ft. 6 in., the corresponding freeboard of the walls being 3 ft. 8 in.

The walls of the dock are of vertical plate-in caissons, rectangular, and are situated on top of the pontoons, of which they form a continuation. They are generally similar to one another except that the starboard wall carries on its top the valve and machinery houses and the port wall carries native accommodation. The main pumping machinery consists of two similar sets, each made up of a semi-Diesel engine driving a centrifugal pump through bevel gear and shafting. There is one pump to each engine. These are of the horizontal vertical spindle type and are placed directly on top of the main drain running along the bottom of the wall. Each pump is fitted with an efficient air ejector driven by its engine.

The pumping plant installations when working together are capable of lifting a vessel of 10 ft. mean draft and of a displacement not exceeding 600 tons within a time of 2 hours, from the time when the ship is centred in position and touching all the keel blocks, and pumping is commenced until the centre of each end of the pontoon deck has a freeboard of 4 in.

A centrifugal pump of 150 gallons per minute capacity is installed in the starboard wall, and a 3 in. fire main with three hose connections is carried along the starboard wall of the dock.

The whole dock is electrically lighted with a 2-wire, direct current system at 110 volts. Four mechanical side shores are fitted. These consist of pitch pine baulks, 12 in. by 12 in. by 22 ft. long, working in a water-tight steel tube passing through the side walls and worked by gearing. Four mechanical bilge shores are also fitted, each consisting of 12 in. by 12 in. timber baulks hinged at one end near the centre of the pontoon deck, the other end being attached to the head of a cast steel rack by means of which the shore is raised and lowered.

A keel block is provided over every transverse bulkhead and breathing plate of the pontoon, whilst an accommodation ladder is fitted at the ends of each wall. A hand capstan, suitably geared and capable of exerting a pull of one ton is installed on the top deck at each corner of the dock. The dock will be moored by 4-stud link cables 2 in. in diameter, one at each corner of the pontoon deck and the valve house is situated on top of the deck house and contains all the gear for manipulating the valves.

Near the ends of each wall a derrick post is provided. Three of these are fitted with a differential pulley block capable of lifting one ton. The fourth is electrically driven and capable of lifting 5 tons. All of these derricks are arranged for lifting a load from the deck of a vessel in the dock into a barge lying alongside.

The dock has been constructed to the designs of Messrs. Clark and Standfield, of Victoria Street, London, Consulting Engineers, and the whole of the work has been carried out under their supervision. The dock will be ready for leaving the Tyne about the middle of July and the contract for its delivery at Abadan has been let by Sir W. G. Armstrong, Whitworth and Co., Ltd., to Messrs. F. W. Peddar and Co., London.

TRADE IMPROVEMENT.

James Pollock, Sons and Co., Ltd., 3, Lloyds Avenue, London and Shipyard, Faversham, are participating substantially in the trade improvement that is so widely advertised. They now have contracts in hand for seven motor tugs, two twin-screw motor barges, one stern-wheeler and six large towing lighters, in addition to which they are building for their own stock account several motor tugs and a motor barge.

Cargo Handling.

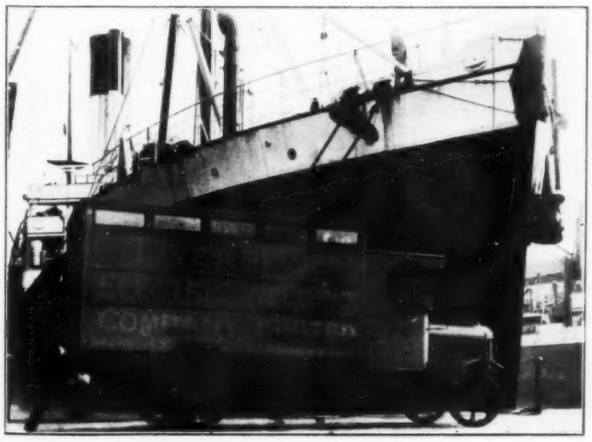
Some Appliances in use at Liverpool.

How important is the factor of mechanical cargo-handling appliances in facilitating the quick turn-round of steamers is sometimes overlooked, but a sure sign of progress is the readiness with which some dock authorities have adopted electrification schemes. With the growth of world trade and the emergence of cargo-carrying liners of increasing size,

British Electric Type of Barrel Transporter.

congestion is apt to arise in dock sheds and on the quays unless their is available means for the prompt clearance of imported goods from the quays. Confusion is worse confounded when, as the writer has frequently observed, approaches to dock sheds are blockaded by vehicles waiting to get consignments, or, when inside the sheds, the operations of checking, weighing and bagging produce, interfere with the freedom of movement of inward overside goods. These latter operations should be conducted at, roughly, the same pace that cargo is raised from the ship's hold, and, if that is done, traffic clearances should be so organised that horse carts, motor lorries and railway trucks are able to take delivery of consignments as fast as they leave the hands of the checkers and weighers. Unless storage spaces are kept clear there will be no room for the reception of outward bound goods, on which a start, of course, has to be made as soon as the steamers' holds have been cleared.

Persons interested in up-to-date mechanical cargo-handling plant, when visiting Liverpool are always attracted by the various operations which are carried on at the West Toxteth Dock Sheds, Liverpool, which are in the service of Messrs. Elder Dempster and Co., Ltd., whose chief importations are palm oil, palm kernels, ground nuts, mahogany, hides, skins and various oil-bearing nuts and seeds. Here there are about 40 Stulyard weighing machines in commission, and these are capable of weighing goods from 1-lb. to 8½ tons. They are fitted with Polyganol weight bars, by means of which the weights may be obtained imperially, decimally and metrically.



Motor Lorries carrying Electric Welding Apparatus are an essential auxiliary at every Port where Ship Repair Work is carried on.

With the beam scale it would take about an hour to weigh 30 casks of palm oil (each about ten cwts.), whereas with the Stulyard machines 120 casks per hour have been weighed with accuracy. Cranes for stowing back and loading off both light and heavy weights are always a useful auxiliary, and amongst the most useful of these are electric elevators with automatic weighers to deal with bulk produce delivered in sacks. Then there are over 30 electric mobile cranes, each of 5 cwt. capacity, several self-propelled steam cranes of from one to five tons capacity, and electric Goliath cranes of seven tons lifting capacity. The latter, which are particularly useful for the handling of giant logs of mahogany and for loading electric trucks, can move seven tons a distance of 900 ft. in three minutes.

Evolution of Barrel Transporters: A Roadcraft Composite Tractor.

Reference has been made to the small electric mobile cranes of five cwt. capacity, and it may be remembered that in a recent issue of *The Dock and Harbour Authority* a photograph of one of these units was reproduced. The writer is informed one of these cranes, with a crew of three men (including the driver), can load off on to carts over 1,700 bags of produce, 1½ cwts. each, in eight hours.

There is another aspect of dockside traffic that merits attention. We refer to the use of electric trucks. These are enjoying an increasing ascendency, and the writer has seen them in use for handling such miscellaneous loads as casks of palm oil, bagged produce, bullion, meat, tobacco, cases of fruit, etc. Different trades have specialised applications of these trucks, and, despite a certain amount of prejudice

One of the Stulyard Bagging and Weighing Machines in service at Liverpool.

against their use manifested by labour organisations, it is obvious that their sphere is growing. At Gladstone Dock, Liverpool, we saw in operation recently an interesting type of Green and Batley electric truck, whose chief virtue was the rapid facility with which it cleared sling loads. By working in conjunction with two table platforms, each of which was supported by four legs, theoretically the truck carrying one platform was being loaded whilst the second platform was being unloaded. At the ship's side the sling load was released on to the tractor, and at the end of the journey to the shed the loaded platform was exchanged for a lightened one, which was brought to the ship's side. Operations were thus con-

tinued. At the dock shed the one ton load, consisting of nine or ten cwt. bags of rice, was hand-trucked to the point of stowage. The truck was working distances of about 50 to 75 yards between the ship's side and the dock shed, and made a round journey in less than two minutes.

A different type of truck has been employed for meat traffic, and the problem that arose in designing a suitable type was securing a sufficiently high loading line, so as to permit of the rapid and convenient transfer of the carcases of meat from the truck to waiting motor lorries, horse-drawn lift vans or railway wagons. It has to be remembered that much of the imported meat landed at Liverpool is cleared from the docks by road vehicle, and the common procedure is to load the meat into insulated lift vans, which are, perhaps, about 5 ft. from the ground level. Were the ordinary type of hand-truck to be used, much labour would be spent owing to the fact that every parcel of meat would have to be lifted from the truck into the lift van. To overcome that, the designers of the trucks built a superstructure on the truck chassis, and this gave an elevation of about 6 ft. The top of the superstructure had a flat platform with outstretched tilted wings, so that as slings of mutton or lamb were swung overboard from the steamer they could be lowered on to the truck without risk of any of the piled carcases dropping to the ground. It does not seem so very long ago that hand-trucking was exclusively employed for the transference of meat from the ship's side to the dock sheds, railway trucks and horse and motor lorries. As meat is deposited on the quay its marks have to be sorted out, and this is always a prolific cause of the demurrage of wagons.

A typical Lansing Truck.

Reference has been made to the handling of casks of palm oil. Messrs. Elder Dempster and Co., Ltd., have for many years experimented in evolving a suitable type of truck capable of loading and unloading itself and able to deal efficiently and expeditiously with such bulky items. We have seen several types in service and, to show the progress which has been made in design, reproduce a photograph of one of the first trucks used for this purpose (Lansing), with which is contrasted one of the latest units (Greenbat truck). In addition to the barrel lifting and transporting device, which operates at the rear of the truck to carry the barrel, the platform of the truck is left clear, which enables it to carry any class of goods which can be suitably put on to it. By ingenious design, the whole of the gear which operates the lifting device is accommodated below the platform and is detachable from the truck. Haulage gear is fitted so that, if occasion demands, the truck may be used as a tractor. This type of unit has Ironclad Exide batteries I.M.V., 10-16 cells, 32-36 volts, 323 at five hour rate of discharge. The battery is independently sprung off the chassis, and this reduces to a minimum the possibility of battery damage through vibration. All operations in connection with driving the truck, hoisting, lowering and transporting the barrels are performed by the driver from the driving platform.

Irish Harbour Matters.

TRANSPORTER BRIDGE FOR DUBLIN.

In reply to some criticisms of the new transporter bridge which the Dublin Port and Docks Board proposes to erect, Mr. C. McGloughlin, a member of the Board, states that this transporter bridge would practically complete the circuit of the Circular Road round Dublin, and the large heavy seaborne traffic coming from the North Wall Extension and the Alexandra Basin would get to its destination in most cases without going through the heart of the city. Crossing the Liffey between the end of Guild Street and Clarence Street it would relieve the present congestion of traffic on the North Quay below Butt Bridge. It would also reduce the traffic in Pearse Street and up city traffic generally. It would take the traffic from the north side of Dublin to the south side without going through the centre of the city. It would reduce the heaviest traffic on the roads up the quays and down Pearse Street. In that way it would largely compensate for its cost, as it is this heavy traffic that does our streets most injury and interferes with the faster and lighter traffic.

"A transporter bridge is not a glorified ferry," says Mr. McGloughlin. "The proposed transporter bridge would have a gondola passing in both directions at the same time—would give, if necessary, a less than five minutes' service. I have seen at Middlesbrough a transporter bridge, with one gondola only, nine hundred people in one trip, and it will take a dozen vehicles and three hundred passengers in one trip. There was no sign of confusion and the circumstances were similar to ours. The proposed bridge in Dublin would give double the service of that at Middlesbrough."

LAUNCHES FROM BELFAST.

Among the vessels launched from Messrs. Harland and Wolff's Belfast shipyards since the beginning of the year are two motor cargo boats for the King line and three shallow draft tankers for Messrs. Andrew Weir and Co., the aggregate tonnage of the five boats being 17,500. Other launches to take place soon include two passenger motor liners each of 14,500 tons for the Nelson Steam Navigation Company.

DUNDALK HARBOUR ACCOUNTS.

The audited accounts of the Dundalk Harbour and Port Commissioners for the year ended 31st December, 1927, show that the income amounted to £10,283 19s. 4d., while the expenditure was £8,324 19s. 4d., showing a surplus of £1,959 0s. 0d. The overdraft on the general account has been reduced from £3,271 15s. 1d. at 31st December, 1926, to £1,850 16s. 3d. as at 31st December, 1927.

The sum of £250,000, part of the cash received in respect of the issue of five per cent. redeemable debenture stock, subscribed during the year, was invested in five per cent. National Loan to the extent of £26,033 pending its utilisation for the development of the harbour.

DUBLIN AND HEYSHAM SERVICE DISCONTINUED.

To a deputation from the Dublin Port and Docks Board, Mr. Baird, Dublin, manager of the Burns-Laird Line, announced that the company had no option but to discontinue the Dublin and Heysham service.

NELSON LINERS TO BE REGISTERED AT BELFAST.

The new motor vessels being built by Messrs. Harland and Wolff for the Nelson Line are to have Belfast as their port of registry.

In making this decision, Lord Kylsant adopted a suggestion made by Viscount Craigavon, prime minister of Northern Ireland, on the occasion of the launch of the "Highland Monarch," at Belfast.

This means that these fine motor vessels will bear the name of Belfast not only on their stern, but on all their deck boats and life belts.

GOODS AND TONNAGE CHARGES IN CORK.

An application has been made to the Minister for Industry and Commerce by the Cork Harbour Commissioners for an Order under the Harbours, Docks and Piers (Temporary Increase of Charges) Act 1920, authorising a modification of the statutory provisions regarding the charges to be made for goods and tonnage. This will be the subject of an enquiry.

WATERFORD HARBOUR ARBITRATION.

The cases for the Waterford Harbour Board at the arbitration in Waterford where the Corporation claim £31,000 from the Harbour Commissioners in respect of maintenance and upkeep of the quays was opened on the 2nd June.

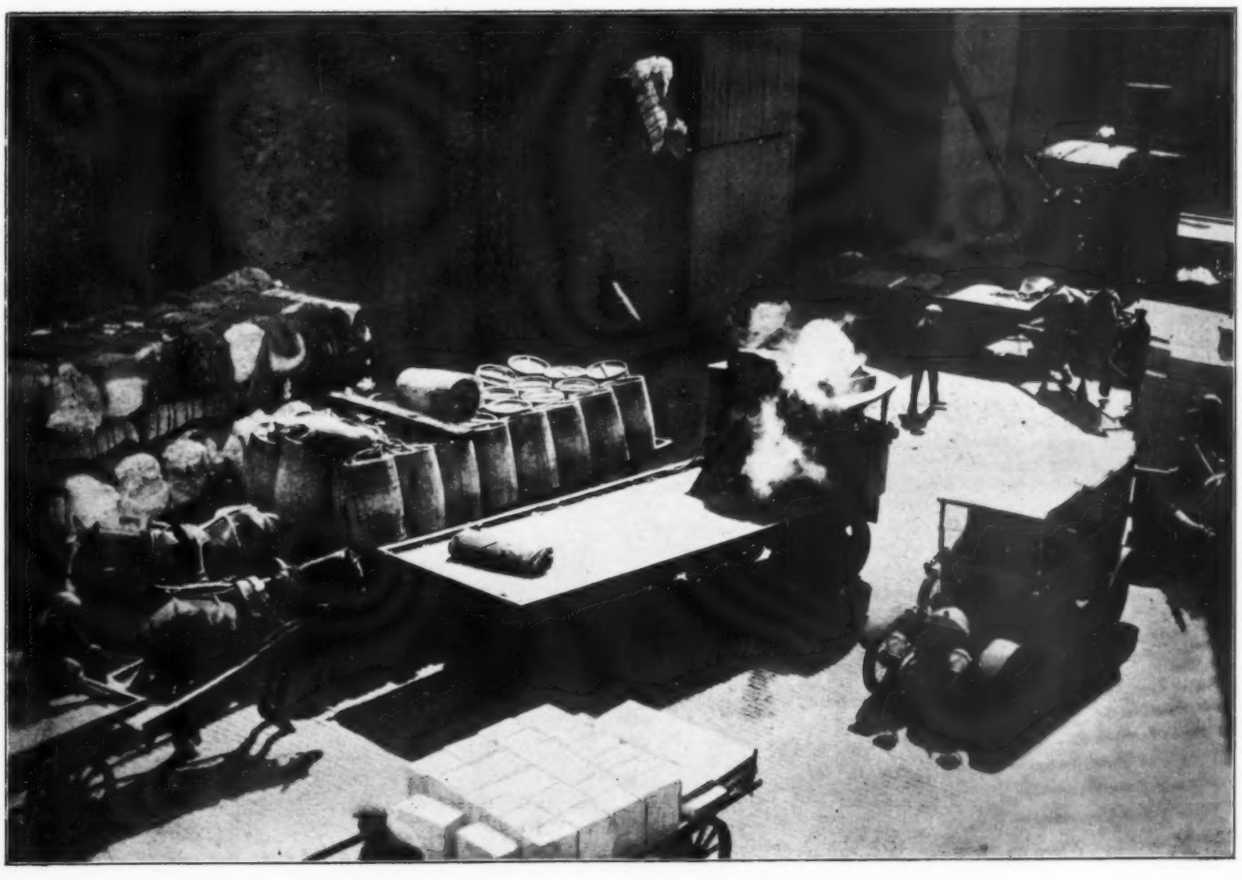
Mr. Phelp, H.C., said that the Harbour Commissioners were always ready and willing to pay whatever was due by them in law, but they were not ready, nor were they empowered by law, to honour claims which were not payable by them under the Act in question.

In 1919, the Harbour Board found that they could not carry on unless they got additional powers to increase their revenue, and then for the first time they went to Parliament to get liberty to charge tonnage fees on cargo. Up to that time there were no charges in the Port of Waterford as against cargo, except what was known as water bailiff's fees, the origin of which was lost in mystery. Two thirds of these were paid to the Harbour Board on their undertaking to do certain works and the Harbour Board had spent £90,000 on harbour improvements. The other one third—over £1,000 a year—had been paid regularly to the Corporation free of any such obligations. This represented contributions due out of shipping revenue towards Corporation funds, and was properly applied by the Corporation to Corporation purposes for the relief of the ratepayers. The Harbour Board admitted that the Corporation owned the bed and soil of the river, but they denied that they built the quay.

In Section 35 of the 1919 Act it was laid down that the Commissioners should pay certain contributions towards the upkeep of what was known as the quays as apart from that portion kept by the Harbour Commissioners.

Cargo Handling Plant at Liverpool.

The Dockside Link between Inland and Ocean Transport. Cases of Motor Cars being deposited on the Quayside at Liverpool for shipment to Australia.



Standard Use of Motor Lorries tends to mitigate Traffic Congestion.

Recent Legal Decisions.

Damage to Docks by Shipping.

Section 74 of the Harbours, Docks and Piers Clauses Act, 1874, has on more than one occasion received anxious judicial consideration, and now in the case of the *Great Western Railway Co. v. Owners of s.s. Mostyn*, 1928, App. Cas. 57, it has been the subject of a lengthy judgment by the House of Lords to which, as it will be the authoritative exposition of the section in the future, we would now make reference.

As to the facts of the case itself, it was a claim for damage done by the anchor of the steamship " Mostyn " to certain electrical cables lying in the bottom of a waterway or communication passage extending between the King's Dock and the Prince of Wales' Dock, Swansea. These works were part of the undertaking of the Swansea Harbour, vested by statute in the appellants, the Great Western Railway Company. When the misadventure occurred the vessel had been in no way abandoned: her officers and crew were all on board. The damage was done without negligence on the part of anybody, but the point was whether under the section referred to, the Dock Authority was not liable to make good the loss, notwithstanding that negligence had not been established against them.

The section is in the following terms:—" The owner of every vessel or float of timber shall be answerable to the undertakers " (the persons authorised to construct the dock) " for any damage done by such vessel or float of timber, or by any person employed about the same, to the harbour, dock or pier, or the quays or works connected therewith, and the master or person having the charge of such vessel or float of timber through whose wilful act or negligence any such damage is done shall also be liable to make good the same; and the undertaker may detain any such vessel or float of timber until sufficient security has been given for the amount of damage done by the same: Provided always, that nothing herein contained shall extend to impose any liability for any such damage upon the owner of any vessel where such vessel shall at the time when such damage is caused be in charge of a duly licenced pilot, whom such owner or master is bound by law to employ and put his vessel in charge of."

The difficulty of construction of that section arose in consequence of the judgment of the House of Lords in the earlier and well-known case of *River Wear Commissioners v. Adamson*, 2 App. Cas. 743. Prior to that case, the section, when under consideration in Courts of law, had been construed according to what was held to be the plain and comprehensive tenor of the language used in the Act, and the shipowner was made, according to that language and subject to the pilotage exception, answerable for all damage done by the vessel to the harbour or its connected works and that in any circumstances. For example, a powerful Court of Queen's Bench, consisting of Cockburn, C.J., Blackburn and Quain J.J., decided the case of *Dennis v. Tovell* and in delivering the leading judgment Blackburn J. used these words: " The legislature has put the owner in the same position as a man who keeps a dangerous animal, who do so at his peril, and be answerable for any injury such animal may do. It enacts simply that the owner shall be liable for whatever damage the vessel may occasion. It appears to me that the legislature has clearly said so, whether it intended it or not." This judgment was expressly followed in the case of " The Merle " decided in the Court of Admiralty in 1874 by Sir R. Phillimore.

The case of *River Wear Commissioners v. Adamson* related to a vessel which had been driven on shore by a storm in endeavouring to make the port of Sunderland. The crew had been taken off with difficulty, and there was no control of the ship. Being a complete wreck she was driven by the winds and waves against a pier belonging to the harbour, and damaged it. An action was brought by the Commissioners against the owners, and damages had been awarded at the trial against them. It was held by the Court of Appeal that the action would not lie. Both in that Court and later on appeal to the House of Lords the opinions of the judges were conflicting in their expressions of the reasons for the judgment, but the general result was to hold that the section did not cover a case where the thing causing the damage occurred by the act of God or the Sovereign's enemies. This was upheld though again on different grounds, in the House of Lords, and if the old law in the case of *Dennis v. Tovell* was not completely overturned by this decision, it was certainly very considerably shaken.

Following on *River Wear Commissioners v. Adamson*, therefore, the legal situation accordingly was that shipowners as such, are by statute liable to dockowners for " and damage done by such a vessel . . . to the harbour, dock or pier;" whereas by the doctrine of that case they are not so liable unless the damage was occasioned by negligence; the statute in short was construed as not increasing the common law liability.

The whole position has been reviewed in the case of the " Mostyn " (*supra*) and by a majority of three judges to two it has been held that the section applies whether there has been negligence or not, in a case where, as in this case, the vessel was at the time of the damage under the control of the owner or his agents. " It may be asked," said Lord Shaw, " if the general doctrine of non-liability except in cases of negligence, was not decided in *Wear v. Adamson* what was decided? To that I reply that *Wear v. Adamson* was a conspicuous instance of a derelict ship from which all human agency had been withdrawn, and it was on that footing, and upon that speciality, and to that extent alone, that the judgment in *Wear v. Adamson* can be applied. I do not say whether or not that can be characterized as a ratio decidendi, and I desire to utter no disrespectful word on that subject, but I must in duty declare that this statute seems to me still to abide in its full and comprehensive application of liability to owners, but that, in deference to *Adamson*, the sole exception, plus the statutory exception of pilotage, is the derelict or abandoned ship case. Respect must be had alike (1) to the statute in its express and general effect and (2) to the decision of this House of an implied and particular exception.

Such an exception ought not to be extended or expanded. This House and Courts of Law should resist that. As to *Wear v. Adamson* I would only add that if it were construed in the broad sense which with so much misgiving it appears to have been taken to mean, it would seem to me to form a curious intrusion of the judiciary into the province of legislature: for I cannot doubt that it was the legislature and the legislature alone (the plain and clear words of the statute being before us) upon whom lay the duty of cutting into those words by an exception equivalent to a pro tanto but a large repeal. The case recalls much older times when the judiciary attempted that. It is recorded that ' when Counsel in a case in 1305 argued for a certain construction of the Statute of Westminster Second of 1285,' he was cut short by the Chief Justice with the remark: ' Do not gloss the Statute; we understand it better than you, for we made it.'"

In these times apparently the statute is to be eviscerated by conceptions *not* of the judges who made the law, but their conception of what was the true and correct line of policy which must be supposed to have been in the minds, and conditioned the words, of those who made the statute. I humbly think this to be both legally and constitutionally unsound, even though it be put forward under the guise of construction. Parliament can and does change its own mind, and it will not under the constitution allow that the judiciary should change its mind for it.

My Lords, in my opinion, we best adhere to both legal and constitutional principle when we affirm the statute, and decline to accept—unless it be where there is the clearest pudicial decision to that effect—a vital and fundamental alternative which should deeply cut into the comprehensive words plainly employed by the legislature.

South Wales Docks.

Concessions to Ship Owners.

A week or so ago, the Great Western Railway Company announced important reductions in dock dues on vessels visiting their South Wales Ports. A further announcement of a still more reaching character, is now made, that vessels changing from one port to another in South Wales will be liable to only one dock due, subect to a nominal locking fee in addition. This gives to the South Wales Ports a new and unique advantage. Vessels entering, say, the Cardiff Docks, to discharge, may proceed to another South Wales Port, e.g. Swansea, Newport, Barry, etc., to load and yet be subject (apart from the locking fee) to dues for one port only. The advantage to shipowners and merchants is immediately apparent. Vessels will have the whole range of the South Wales Seaboard in which to discharge or load, and their opportunities of securing remunerative freights in both directions is greatly enhanced. It will assist merchants and manufacturers to effect shipment or discharge at the nearest, and therefore, cheapest, port to the origin or destination of the traffic.

The dues on vessels in South Wales are amongst the lowest in the country, and this further concession should have an immediate and cumulative effect in stimulating the overseas trade of South Wales and its hinterland.

The concessionary arrangements now in operation in South Wales now include:—

1. Vessels changing Docks pay one set of dues, plus a locking fee.
2. Vessels entering for dry docking pay a locking fee only.
3. Vessels with part cargoes pay dues on the traffic shipped or discharged if less that the register tonnage.
4. Vessels calling for bunkers only, pay 4d. per ton register—a return to the pre-war rate.
5. Liners requiring bunkers or loading part cargoes of coal are given priority for coaling.
6. An allowance of (a) 5d. from the railway rate; and (b) 1½d. per ton from the tipping charge is given on coal carried in 20-ton wagons.

American Harbour Personalities.

II.—MR. GEORGE F. NICHOLSON.

Port engineering officials of the United States have been recruited very largely from the ranks of those who first have succeeded in the railway branches of their profession. A thorough understanding of the problems of railway engineering has, become, in fact, a practical necessity. Mr. George F. Nicholson, harbour engineer for the City of Los Angeles, and present secretary for the Association of Pacific and Far East Ports, is one of the younger generation of port engineers to whom the opening remark applies, and, although his railway experience was comparatively brief it was of extremely important nature, touching immediately on port activities and leading him almost at the beginning of his career into port work. His activities in this class of work have been connected continuously during that period with the two United States west coast ports which are best known for the rapid and successful development of their public-owned ocean terminals—Seattle in the north-west and Los Angeles in the south-west. During the whole time that the port of Seattle was developing its present harbour plan and structural design, he was in charge of those phases—twelve years in all; and for the past three years he has been in charge at Los Angeles of the great problems created by an expansive growth which is without parallel in port records, particularly those relating to the co-ordination of land transport and interchange facilities with the ocean terminals.

Mr. Nicholson, a native of Terre Haute, Indiana, received his degree in mechanical engineering in 1906, and it was not until 1921, after several years of actual experience with civil engineering, that he received the degree of civil engineer from the Rose Polytechnic Institute—long after he had accomplished considerable success as a port engineer. The years 1906 and 1907 he spent in Mexico on important location and construction work for the Mexican Central Railway Company. This included location of the railroad line through the mountainous country from Mexico City to Tampico on the Gulf coast, and the location and construction of railroad line from Mexico to Mazatlan on the Pacific coast. In the early part of 1908 he returned to the United States and located in the Pacific north-west. From that date until 1910 he was with the Chicago, Milwaukee and St. Paul Railway as resident engineer in charge of railroad construction in the building of this road's main line to the North Pacific Coast.

It was in the early part of 1910 that Mr. Nicholson's activities were actually indentified with harbour planning and development. At this time he became associated with the late Mr. Virgil G. Bogue, of New York, consulting engineer and one of the foremost technicians engaged in the field of city and harbour planning. During the next two years Mr. Nicholson was continually engaged in the preparation of comprehensive development plans for ports of the Northwest—none of which had then come into great prominence and some of which only became known through the developments which occurred after these plans were submitted. These investigations and reports covered practically all of the now well-known harbours of the Northwest, including such as Vancouver and Prince Rupert, B.C., Seattle, Tacoma, Grays Harbour and Astoria.

In 1912 a public port district, organised under the laws of the State of Washington, was formed at Seattle for the development of public-owned port facilities, and Mr. Nicholson was immediately employed by this organisation—known as the Port of Seattle—and with the title of assistant engineer was in charge of all harbour construction work thenceforward. In 1916 he was appointed harbour engineer and in 1921 he was given the additional title and office of executive secretary, thus becoming the head of the executive staff as well as of the engineering staff for the port. In brief, the public port developments which were carried out under his direction include: seven modern harbour terminals, two cold-storage warehouses, four general merchandise warehouses, ample open landing and storage facilities, an ice-manufacturing plant, a million-bushel export grain elevator, a fresh fish storage warehouse, and a geat vegetable oil receiving and storage plant capable of accommodating 1,600,000 gallons. All of these are equipped with modern handling appliances and with all necessary appurtenances for the accommodation of freight and shipping. Detailed description of these facilities would occupy considerable space, but it is worth while to mention that Mr. Nicholson had the distinction of constructing the famous Smith's Cove Terminal, which, at the time, were the largest commercial piers in the world, pier "B" being a solid-fill structure 2,580 ft. long and 357 ft. wide, with two-storey transit shed, and five miles of railroad trackage on its deck—the cost of this pier having been $2,500,000.

In 1923 Mr. Nicholson was on leave of absence for eight months, and during this time he prepared a comprehensive plan for the future development of the ports of Queenstown and Cork, in Ireland, for the Cork Harbour Commissioners. He also visited and inspected all of the important European ports at this time for the benefit of his own board.

On the 1st of January, 1925, Mr. Nicholson was appointed harbour engineer for the City of Los Angeles. Los Angeles harbour consists of the old ports of San Pedro and Wilmington which have been incorporated into the city and which are connected therewith by a narrow overland strip known as the "shoestring." Here Mr. Nicholson has been faced with problems which, as hereabove mentioned, were the result of rapid growth during various changing administrations. He has already accomplished considerable development work in the harbour and on its land approaches. As a result of numerous conferences with officials of railroad lines entering the port, he has brought into being a unification agreement whereby the railroad facilities of the harbour district function under a separate operating corporation, known as the Harbour Belt Line Railway. This unification problem has been the most vexing of all the difficulties which the Los Angeles Board of Harbour Commissioners—a municipal organisation—has faced. Its solution, therefore, may be rated as a very fine accomplishment for the harbour engineer, who had to bring together so many divided interests and had to solve so many physical problems in reaching a workable conclusion. Three hundred and fifty acres of land are being purchased for use as a railroad classification yard for the accommodation of all freight cars serving the harbour.

Mr. George F. Nicholson, C.E., Harbour Engineer, City of Los Angeles; Secretary, Association of Pacific and Far East Ports

New terminals for shipping at Los Angeles also have been designed and constructed by Mr. Nicholson, all incorporating the latest ideas for expeditious service, and especially taking care of the phenomenal increase which Los Angeles has experienced in the demand for special construction and layout to accommodate motor-truck traffic. Several dredging projects have been complete for the widening and deepening of water areas and channels, and for reclamation of large areas to provide new sites for terminal facilities and industries. A very significant accomplishment has been the connection of the Santa Fe railroad system with the harbour by the building of a permanent railroad line which is costing approximately $1,000,000.

Mr. Nicholson is the author of numerous articles on port matters, particularly on mechanical freight handling equipment. He is a member of the leading engineering societies and of the principal social clubs of the west coast.

LIMERICK HARBOUR LOAN.

The Free State Ministry of Industry and Commerce has refused the application of Limerick Harbour Board for a guarantee for a loan of £125,000 for the purpose of dock extension. This decision is based on the view of the Ports and Harbour Tribunal, that the resources of the port, after paying all relevant liabilities, would not be sufficient to meet the charges on the loan granted them: £85,000 on a sinking fund basis and £110,000 on an instalment basis, if the Harbour Commissioners had the power to adopt the latter method.

Harbour Structures.

II.—Use of Concrete and Metals.

By WILLIAM G. ATWOOD, Consulting Engineer
New York.

STONE AND CONCRETE.

Stone masonry for piers, quays and dry dock construction has been used for many years and is very durable if the stone itself is good and the cement withstands the attack of saltwater. Limestone is not as durable as granite or dense sandstone and seems from the small amount of data available to be more subject to attack by boring animals.

These animals are of two types, one, the group of pholads, resembling the clam in structure, bores by mechanical means and may attack any type of stone; the other acting through a chemical dissolving agent is not important except in its attack on the limestone.

The rock borers which do their work by mechanical means are of the families Pholadidae, Carditidae, Saxicavidae and Petricoladidæ and are widely distributed.

Several of the sponges and annelid worms also bore rock by means of solvents secreted by themselves as do some of the molluscs of the genus Lithophoga.

There is very little information available regarding the damage done by these animals except that the breakwater at the English Port of Plymouth has been badly damaged and concrete in the Panama Canal Zone and in Los Angeles Harbour has been practically destroyed by some of these borers, principally pholads.

Some Portland cements seem to be subect to chemical attack by the sulphates in sea water. There is much discussion of this matter and the reasons for this attack and the peculiar characteristics of the cement subject to this type of attack are as yet unknown. Caution should be exercised in selecting the cement to be used. No brand except one with a record of long life in salt water should be permitted.

METAL STRUCTURES.

These metals have been quite generally used for wharf construction and from a study of the available service records it would appear that, since there has been little of this type of construction in recent years, their value has not been generally appreciated.

USE OF STEEL.

Steel is the least durable of the three metals and is not to be considered a desirable material for general use at present. When corrosion resisting alloys are developed as a result of the tests now being carried on by the committee of the Institution of Civil Engineers on "Deterioration of Structures of Timber, Metal and Concrete Exposed to the Action of Seawater" or otherwise the facts may justify the use of special steel. At the present time the cost of special steel is so high as to preclude its use even had long time tests shown its value.

The following steel structures are of record and allowing for the differences in the character of inspection, do not indicate a satisfactory economic value for steel:—

Location	Date built	Members	Condition
Berth 7, Karachi, India ..	1890	Piles and Braces	22% of section lost by corrosion
Puerto Plate, San Domingo	1895	½-in. Steel Plate cylinders ...	Metal practically destroyed above h.w.
N. & W. RR. Norfolk, Va.	1898	Steel cylinders, concrete filled	10% metal lost by corrosion
U.S. Navy, Key West, Fla.	1898	6-in. steel piles...	Piles still good, bracing badly corroded
U.S. Navy, Tutuila, Samoa	1900	6-in. & 8-in. steel piles	Good
N. & W. RR. Norfolk, Va.	1901	Steel cylinders, concrete filled	1/32-in. loss by corrosion
U.S. Army, S. Francisco	1903	Steel piles ...	Good
La Boca, Panama Canal Zone	1908	Steel cylinders, concrete filled	Cylinders corroded and concrete destroyed by borers
Secondee, Sierra Leone	1906-9	Steel piles ...	Good
Kowloon, Hongkong ...	1907-9	H-sec. rolled piles	Bad condition in 1915 and encased in conc'te
N. & W. RR. Norfolk, Va.	1913	Steel cylinders, concrete filled	Good

Most of the inspections reported above were made between 1921 and 1923 so that it would appear that steel is generally seriously injured in about 20 years. This is too short a life to justify the high first cost.

WROUGHT IRON.

Wrought iron of the character on the market 20 to 30 years ago is very difficult to obtain now but the records indicate that if it can be obtained it is a valuable material for harbour construction.

The oldest structures for which records are available are the braces on the Mucking Lighthouse at Thameshaven and the piles and braces in a series of lighthouses on the Florida Keys. These were built in 1851 and 1852 and after over 70 years life are reported to be in good condition.

Other structures are as follows:—

Location	Date built	Members	Condition
Madras, India	1872	8-in. piles ...	Reduced to 7-in. in 1921
Aden, Arabia	1875	4-in. screw piles	Corroded ½-½-in. in 1908
U.S. Navy, Key West, Fla.	1879	Piles	Serviceable, but badly corroded above h.w.
U.S. Army, San Francisco	1886	10-in. piles ...	Poor
Secondee, Sierra Leone ...	1899	Piles	Good
Singapore	1913	Cylinders concrete filled...	Good

The average life of these structures certainly indicates the desirability of considering wrought iron as a suitable material for use in wharves in spite of the relatively high first cost.

CAST IRON.

Cast iron does not corrode as steel and wrought iron do in seawater but its composition changes very gradually to graphite. White cast iron changes much less rapidly than good commercial grey iron but it is much more brittle and consequently more difficult to handle during construction and more liable to be broken by shock after it is in place.

Available reports show four structures, three in England and one in Ireland built of cast iron between 1840 and 1851 are still in service and said to be in good condition. Practically all cast iron structures are built on piles or columns. Other structures recorded are as follows:—

Location	Date built	Condition
Wellington, N.Z.	1865	Removed 1915, small amount of graphite
Liverpool, Eng. Before	1870	Good
U.S. Army, San Francisco...	1870	40% of piles broken by shock
Auckland, N.Z.	1870	Good
Fleetwood, Eng.	1872	Good
Holyhead, Eng.	1878	Good, some spots of graphite
U.S. Army, San Francisco...	1888	Good, 2 piles broken in 34 years
U.S. Army, Fort Monroe, Va.	1889	Good, few piles broken
U.S. Army, San Francisco...	1890	Fair
U.S. Army, San Francisco...	1891	3 piles replaced in 31 years
Thameshaven, Eng. ...	1894	Good

Five other U.S. Army wharves are reported built in southern waters between 1900 and 1911 and all are said to be in good condition.

Cast iron piles and columns should always be filled with concrete in order to give them support and reduce breakage from shock either by driftwood or vessels, but records indicate that probably even in some of the oldest structures this was not done.

The relatively high first cost of cast iron construction is not justified unless there is reasonable certainty that the structure will not become obsolescent for many years. If this be the case, cast iron is certainly a material to be seriously considered.

Many of these structures are built with the metal in the form of piles which is entirely satisfactory with steel or wrought iron, but the practicable length of cast iron is limited and recourse is frequently had to a timber pile foundation driven or cut off below the mud line with cast iron columns above the piles but extending far enough into the bottom to be below any possibility of scour. The problem of bracing such a structure is serious but can be satisfactorily overcome.

Cylinder piers made of steel or wrought iron plate and filled with concrete have also demonstrated their efficiency. They can be set directly on a suitable foundation or a pile foundation can be driven with wooden piles. Here again the bottom of the cylinder must be set at a sufficiently low elevation to make under-scouring impossible.

The writer believes that much more consideration than is usually the case should be given to the use of wrought and cast iron. They have their disadvantages but they also have many advantages.

HEAVY GRAIN SHIPMENTS THROUGH VANCOUVER.

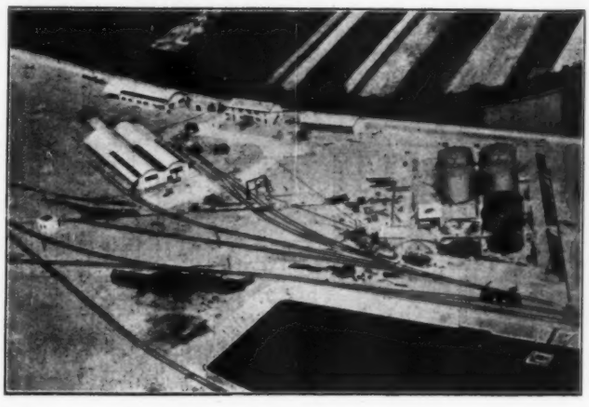
The Vancouver correspondent of the "Financial Post" (Toronto) reports that the movement of grain through the Port of Vancouver this season will total more than 70,000,000 bushels, if not another bushel beyond that already en route is shipped from the prairies.

The railways have issued permits amounting to 79,589,450 bushels, but all of these, may not be used. However, the Vancouver Harbour Board has been advised that at least 15,000,000 bushels of wheat awaits threshing in Alberta and all this is to be routed via Vancouver.

There is no doubt that all past records for volume of grain shipped through this port will be broken. The previous record was 54,735,000 bushels, attained in the 1923-24 season. Prince Rupert has so far shipped more than 7,000,000 bushels. It is probable that by the end of the season British Columbia ports will account for close on 100,000,000 bushels.

The United Kingdom and the Continental grain markets have been largely responsible for the heavy volume of grain this season. Shipments to the Orient and Australia have been lighter than usual. Up to the end of March the British Isles and Continental Europe had taken all but 9,000,000 bushels of grain shipped through Vancouver. During the month 57 vessels loaded grain there.

The Port of Strasbourg.



South End of Oil Wharves.

Left Bank, Bassin d'Austerlitz, with Grain Unloader of the bucket chain type.

Bassin de Jonction, Coal Bridge and Gasworks.

View of Lauterbourg, 50 kilometres from Strasbourg.

View showing the Rhine on right and the Entrance Harbour on left, with new Oil Wharves in background.

Bassin de l'Industrie, West Bank, with a Rhine Barge and Three Bridge Cranes.

Port Entrance and East Wharves.

South End of Bassin d'Austerlitz.

The Port of Strasbourg.

Extension Scheme in Two Stages to cope progressively with Traffic. New Harbour Works and Railway Facilities.

By ROGER VEVER, Ing.E.C.P.

INTRODUCTION.

THROUGH the courtesy of M. Michael-Schmidt, the noted French Port Engineer, and of M. Haelling, Ingénieur-en-chef des Ports et Chaussées and General Manager of the Port of Strasbourg, we are able to give details of the expansion of this inland river harbour. It will be remembered that Strasbourg has recently been made a self-managing harbour, like Havre and Bordeaux.

Typical Rhine Tug.

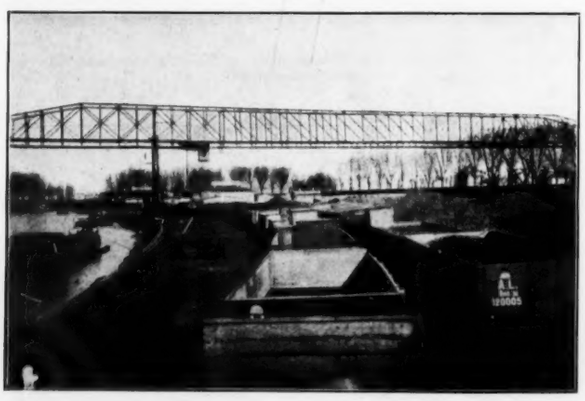
THE RHINE NAVIGATION.

In olden days traffic was carried through Strasbourg from Basle to the sea, downstream only; the barges, of a tonnage of less than 100 metric tons, which were then in use, had to be dismantled and sold as timber on reaching the sea, as it was impossible to tow them up the river again.

It was after Napoleon's time that the Rhine became a well-patronised waterway. From 1825 on steamers began to ply regularly between Strasbourg and the sea, carrying both passengers and cargo; the upper course of the river was still unsafe because of the strong current and of the great number of islands.

In 1840 the scheme for improving navigation advocated by the engineer, Tulla, was embarked upon by the countries concerned. It included the building of river walls and the opening of several cross-cuts, thus creating the existing channel.

Despite the fact that the length of the waterway had been shortened by 25 per cent., owing to the increased speed of the current, it was found impossible for barges to compete successfully with the railways, and from 1855 Rhine navigation beyond Mannheim was almost abandoned. In 1832 the canal from the Rhône to the Rhine connected it to the river Saône, and thereby Lyons and Marseilles. It may be mentioned that on this



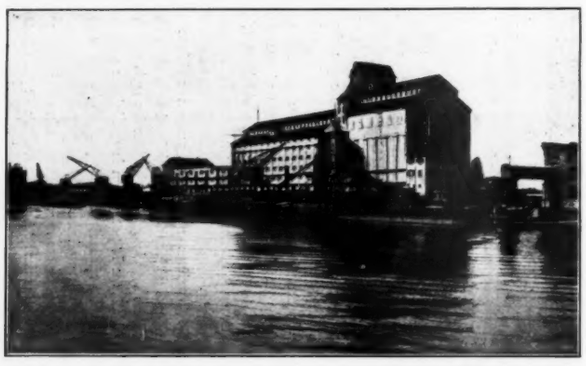
Transporter Bridge for handling Coal.

canal is the Huninge Junction, which has recently been improved so as to accommodate barges of 300 metric tons and enables canal vessels to ply between Strasbourg and Basle. It was in 1853 that the canal from the Marne to the Rhine provided a link to Paris and Havre, via Nancy, Toul, Chalons-sur Marne, and was used by 280 metric tons barges of the French standard type. To-day a branch canal passes through the Sarre coalfields. This shows how well Alsace is connected to the French ports. It should be noted that until 1892 Strasbourg remained simply a canal port.

DOCKING FACILITIES.

PORT D' AUSTERLITZ.

This dock was put into commission in 1892; it is connected to the Rhine, as shown on Supplement, by two locks. Its



Grain Silos and Warehouses, East Bank of Bassin du Commerce.

dimensions are as follows:—Length, 550 metres; breadth, 50 metres; total quayage, 3,700 metres; total area, 46 hectares; water area, 10 hectares; and depth of water, 2.80 metres.

The dock has good railway facilities, accommodates large Rhine barges and is used for grain and general cargo traffic.

BASSIN DU COMMERCE.

Built in 1891 this dock is lined by warehouses, electric cranes and railway trucks, and is chiefly used by the grain and coal trades.

Two large flour mills with a daily output of 10,000 bags of flour, are located on the banks. The grain is elevated from the barges by means of bucket chains and brought to the silos by belt conveyors.

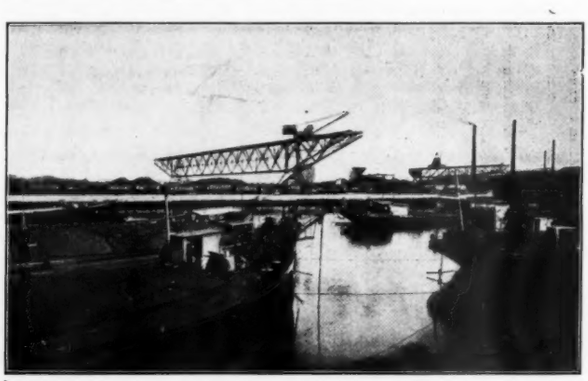
The dimensions of the dock are as follows:—Length, 1,000 metres; breadth, 100 metres; and quayage, 1,900 metres.

BASSIN DE L'INDUSTRIE.

This was built in 1901 and gives access to the shipyard. The greater part of its traffic is connected with the coal stores and the timber yards.

It is 1,000 metres long and from 30 to 100 metres wide.

The entrance harbour at Strasbourg has a length of 800 metres and a breadth of 120 metres.



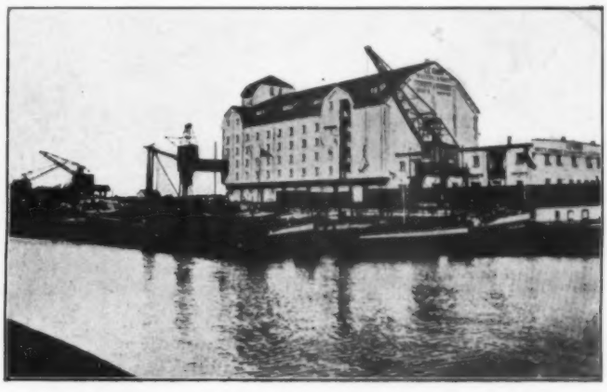
Bassin de l'Industrie, South End. The Bridge Crane has a length of 135 metres and a span of 95 metres.

OIL WHARVES.

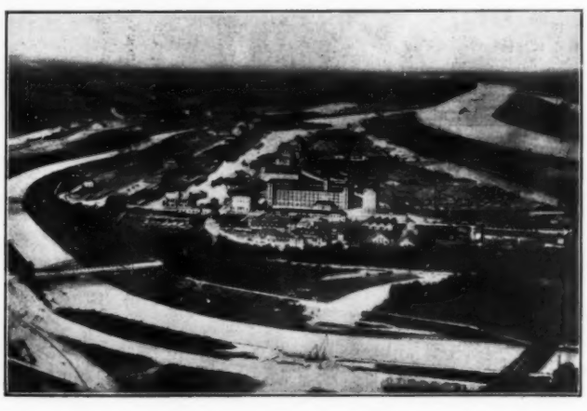
The oil wharves are some distance apart from the rest of the harbour and further extensions of both groups of wharves will be carried on the same building line, so that their distance will remain unchanged.

The Port of Strasbourg.

Potash-handling Appliance. Bassin des Remparts. The trap-door of the wagon is opened and the material falls through a hopper on to a belt conveyor, which lifts it up above the barges.



Stores of Bassin du Commerce, Gantry Cranes and Grain Unloaders.

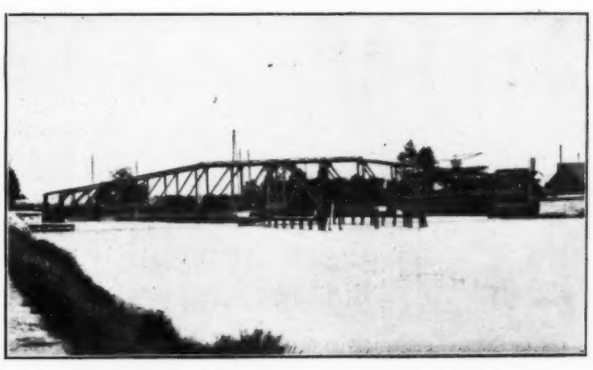


Aerial View of the Port.

Public Warehouse and Grain Unloader.

Warehouse, Bassin du Commerce, Gantry Cranes and Grain Unloader.

Entrance to the Port.



Electrically-operated Revolving Railway Bridge spanning a Lock. Coal-handling Bridge Crane equipped with 5-ton Grab Bucket.

General View of the Bassin du Commerce.

The wharves have a length of 900 metres and a breadth of 100 metres at the north end and 70 metres at the south end. The ground area is 200,000 square metres.

Grain-handling Equipment.

PORT FACILITIES.

There are six warehouses. Four are located alongside the "Bassin du Commerce," while the two others line the "Bassin des Remparts" and "Bassin d'Austerlitz" respectively. The latter includes a group of silos, granaries and covered markets.

The aggregate floor area is 70,000 square metres, and the capacity of the silos 14,000 square metres. Belt conveyors, bucket chains and elevators provide rapid delivery of the grain, either in bulk or in bags, to and from all storeys.

CRANES AND ELEVATORS.

Equipment includes 45 steam and electric cranes, nine grain elevators, nine floating cranes and 15 coal handling cranes, distributed among the various docks. There are 15 coal bridges with spans ranging from 80 to 100 metres, which can deal with over 5,000 metric tons of coal daily.

The total area of the coal yards is 400,000 square metres, with accommodation for 500,000 tons. One of the coal yards is entirely devoted to lignite patent fuel, while two others supply synthetic fuel plants and coke and gas works respectively. The coke is despatched to Lorraine for use in the blast furnaces, while the gas is used municipally.

COAL BRIDGE AT "BASSIN DE L'INDUSTRIE."

The bridge at this dock, operated by Messrs. J. Kronberg and Sons, was built by Messrs. Caillard and Co., of Havre. It is 135 metres long and travels 230 metres over two rail tracks 95 metres distant from one another. The lower beam is 6 metres above the ground; it carries a 5.5 metric tons grab bucket, a travelling crane with radius of 15 metres, as well as a 22 tons hopper. The crane grabs the coal at any spot within a 3 hectares area, either from the barges or the heaps, and fills the hopper, which delivers it to the required place through movable channels arranged beforehand. As much as 100,000 metric tons of coal may be stocked within the grab reach.

Conveyor Gallery with Grain Barges below.

The bridge is also fitted with a concussion coal screen which sifts the coal into three classes according to its size; the coal can be conveyed either direct to railway trucks in bulk, or to bag-filling plants with a total output of 1,000 bags of screened coal per hour.

The crane weighs 60 metric tons and travels over the bridge at the pace of 2 metres per second, while the hopper's speed is 3.5 metres per second. The total weight of the bridge is 550 metric tons, and its travelling speed 20 metres per minute.

SAFETY FIXTURES.

Besides the ordinary brakes a special contrivance stops any movement of the bridge that may be caused by the wind.

Electric current is automatically switched off the travelling motors as soon as the bridge ceases to be perpendicular to the rail tracks.

Slopes and steel balls act as buffers for the crane if the man in charge has failed to stop it in time at the bridge ends.

The balls slide in special grooves while going up the slope, thus producing the braking effect, and roll down smoothly by gravity with the crane when it comes back to its normal level.

ORE-LOADING APPLIANCE.

This plant is located on the east bank of the entrance harbour and is used for unloading ore into barges from specially designed 40 ton wagons fitted with side doors. The latter are lifted up a slipway which overhangs the barges, and the ore falls into them through hoppers and chutes.

The hopper is carried by the lower part of the lift. The height to which the wagons are lifted depends upon the season and the floods, which annually occur. Special shock absorbers reduce the speed of the lumps through the chutes and thus prevent any damage to the hulls of the barges. Counter-weights economise working power wherever possible. Two attendants only are required to load over 400 tons of ore per hour.

Flour Mills at the Port.

POTASH HANDLING APPLIANCE.

This appliance was erected at the "Bassin des Remparts" by the "Societe Commerciale des Potasses d'Alsace" to cope with expanding potash traffic at Strasbourg.

The 40-ton potash wagons are emptied through a bottom trap door into a hopper which spreads it on a belt conveyer. The potash is thus brought above the barges and falls into them through the chutes.

PORT EXTENSIONS.

The port extensions as shown on the Supplement will be carried out in two stages, enabling the port to cope progressively first with a traffic of 6,000,000 tons and then 10,000,000 tons. The cost of the first addition is to be borne by the French Government.

Existing quayage totals 10,600 metres. Respective additions to quayage planned are: "Bassin des Remparts," 2,400 metres; "Nouvelle Jonction," 5,000 metres; No. 1 South Dock, 2,000 metres; and New Oil Wharves, 2,000 metres. When these extensions are completed there will be a total quayage of 22,000 metres to deal with an estimated 6,500,000 metric tons.

The second part of the scheme provides for five docks 1,000 metres long with an aggregate quayage of 10,000 metres, making a total quayage of 32,000 metres for an estimated 10,000,000 tons.

QUAY WALLS.

Twenty-five per cent. of the total quayage will be of vertical type. Sloping embankments, which are much cheaper to build, will be used whenever possible, as in the case of the coal, grain and oil wharves.

ESTIMATED COST OF EXTENSION WORKS.

FIRST SCHEME.

Harbour works, 100,790,000 francs; railway facilities, 67,350,000 francs; total, 168,140,000 francs.

SECOND SCHEME.

Harbour works, 67,700,000 francs; railway facilities, 11,000,000 francs; total, 78,700,000 francs.

The greater part of the work to be carried on in the first scheme will also be helpful to the second.

PORT OF STRASBOURG EXTENSION.

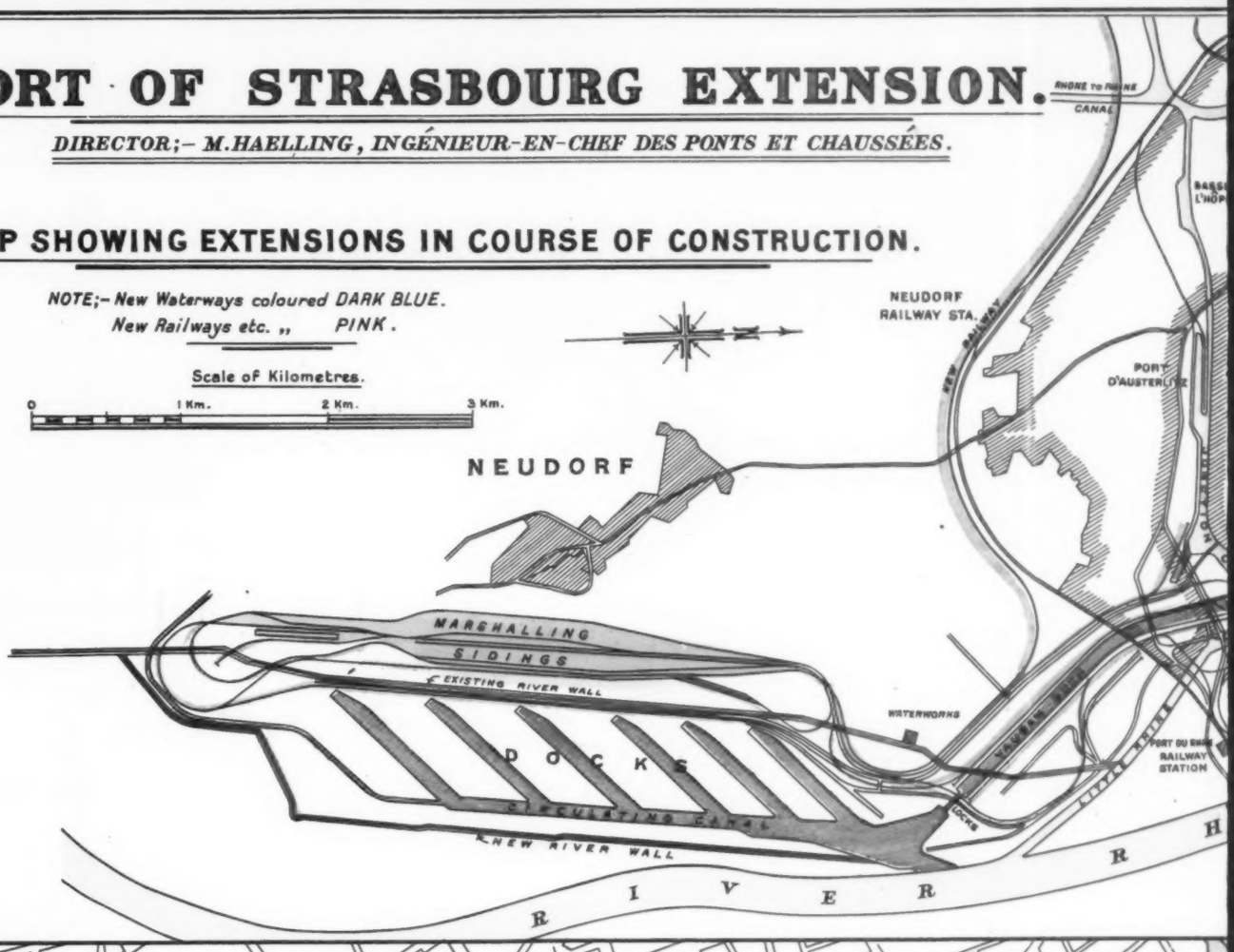
DIRECTOR;– M.HAELLING, INGÉNIEUR-EN-CHEF DES PONTS ET CHAUSSÉES.

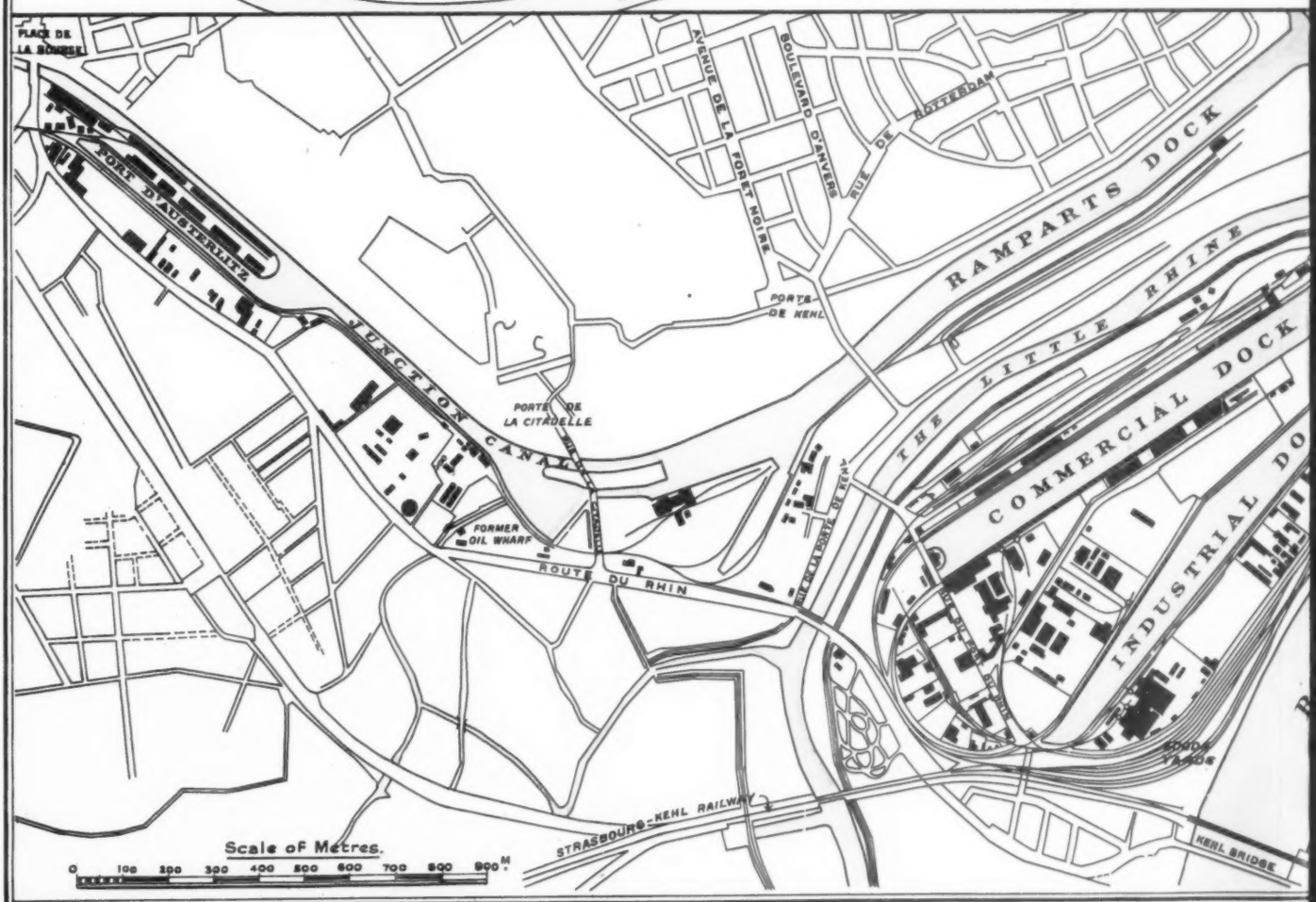
MAP SHOWING EXTENSIONS IN COURSE OF CONSTRUCTION.

NOTE;– New Waterways coloured DARK BLUE.
New Railways etc. ,, PINK.

Scale of Kilometres.

0 1 Km. 2 Km. 3 Km.





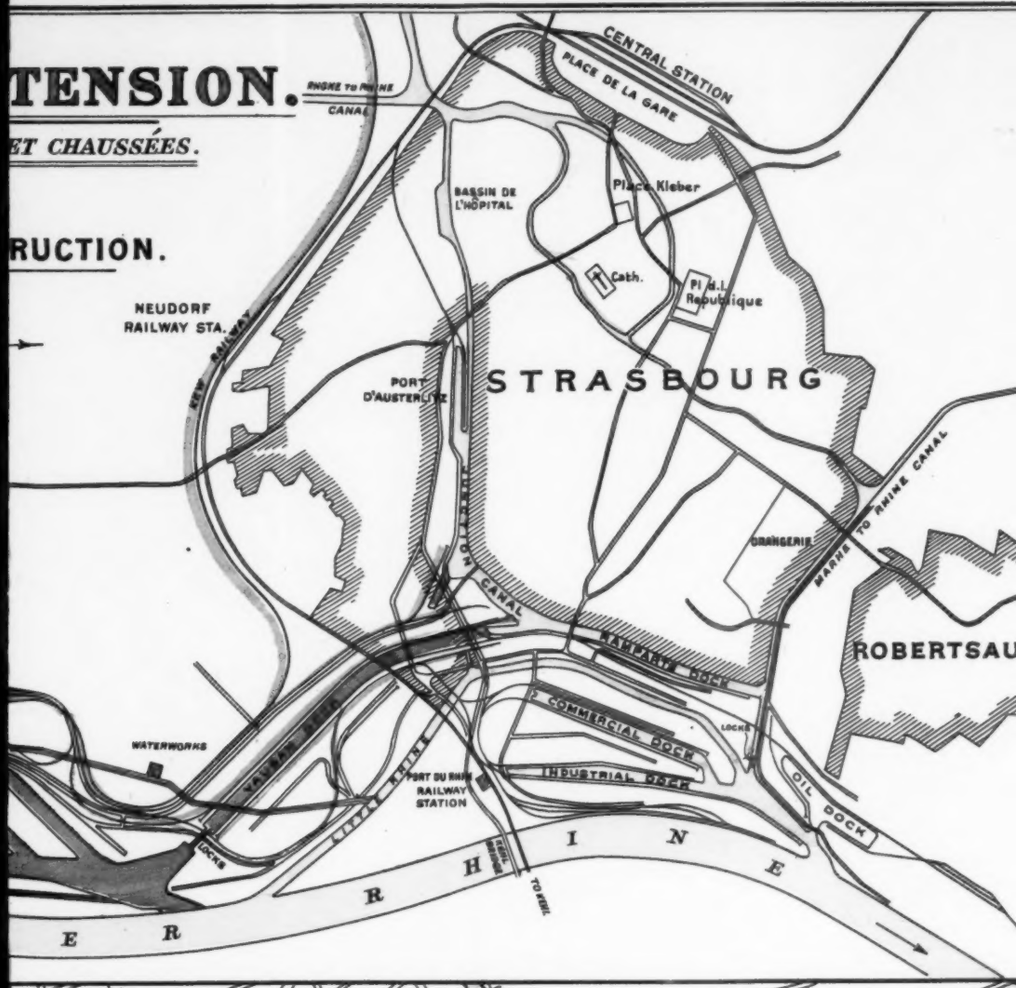
WARD & FOXLOW. Harcourt St. Marylebo

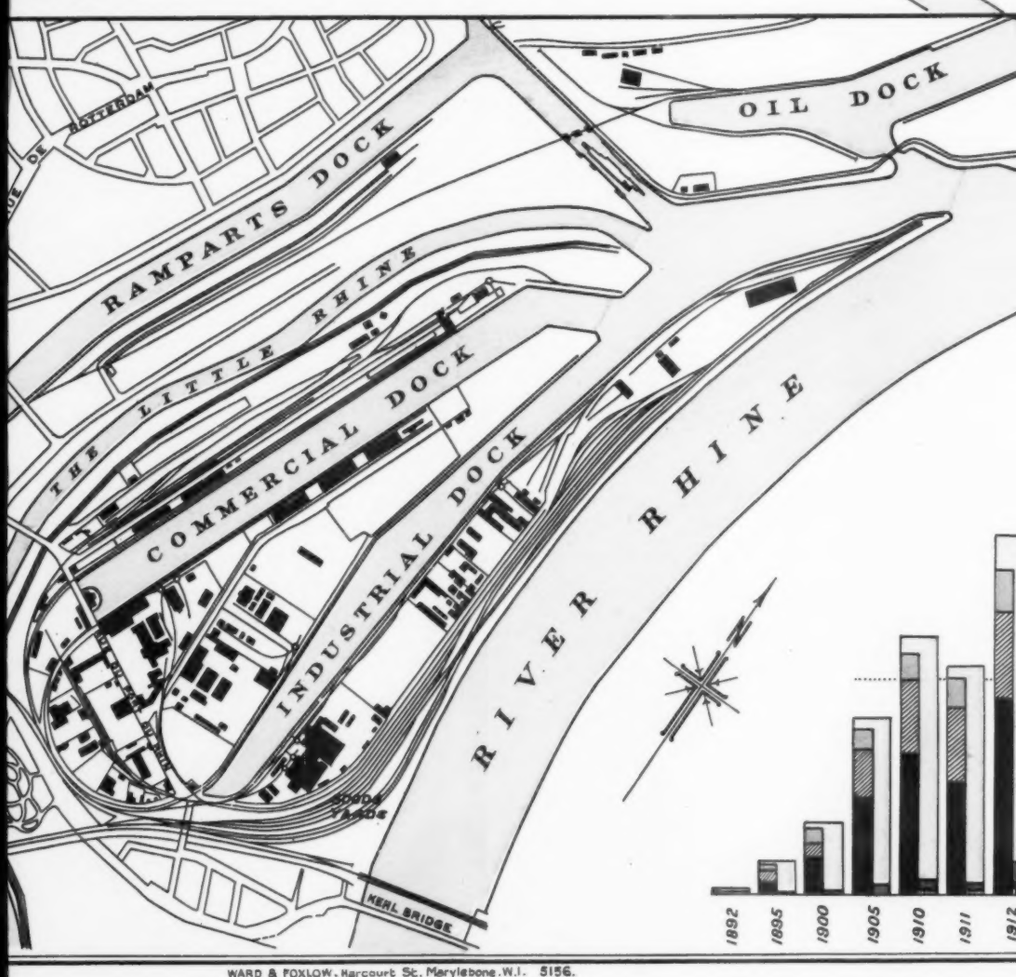
THE DOCK AND HARBOUR AUTHORITY —

TENSION.

ET CHAUSSÉES.

RUCTION.





WARD & FOXLOW. Harcourt St. Marylebone. W.1. 5156.

KEY MAP.

NOTE.

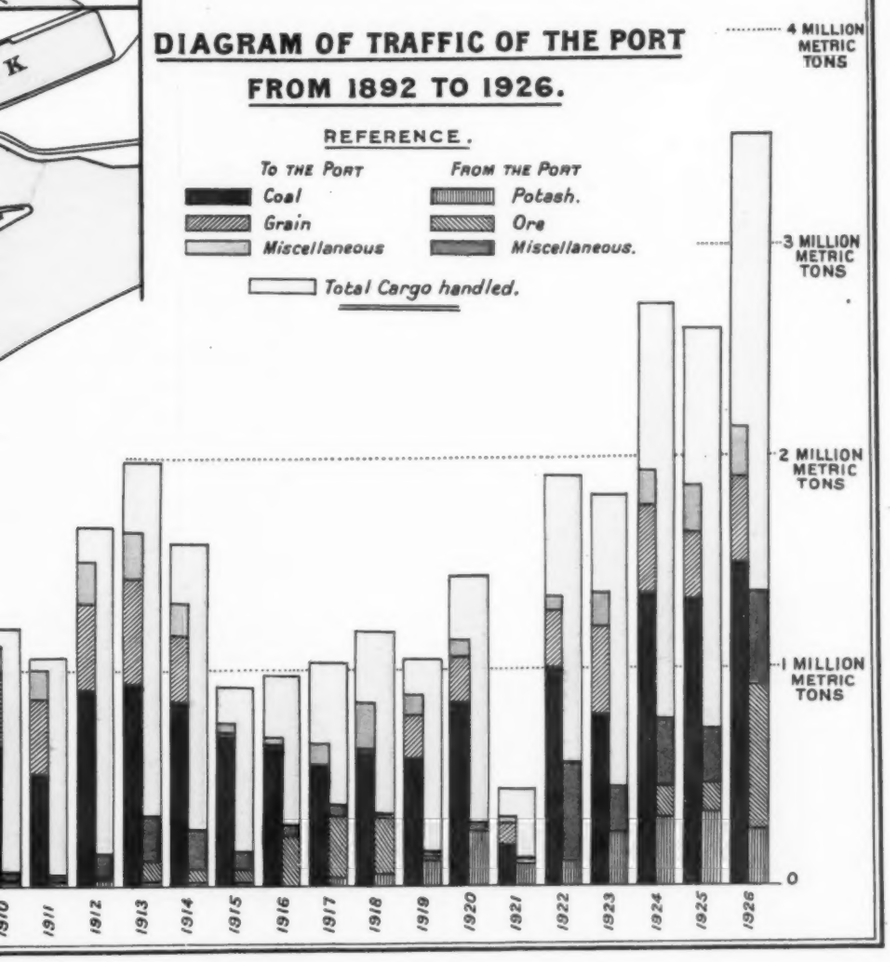
Cranes & Grain Elevators compriee 45 steam & electric cranes, 9 grain elevators, 9 Floating cranes & 15 coal handling cranes. There are 15 coal conveyors with an aggregate daily capacity of 5,000 metric tons; also lifts for loading ore & potash into barges.

DIAGRAM OF TRAFFIC OF THE PORT FROM 1892 TO 1926.

REFERENCE.

TO THE PORT	FROM THE PORT
Coal	Potash.
Grain	Ore
Miscellaneous	Miscellaneous.

Total Cargo handled.

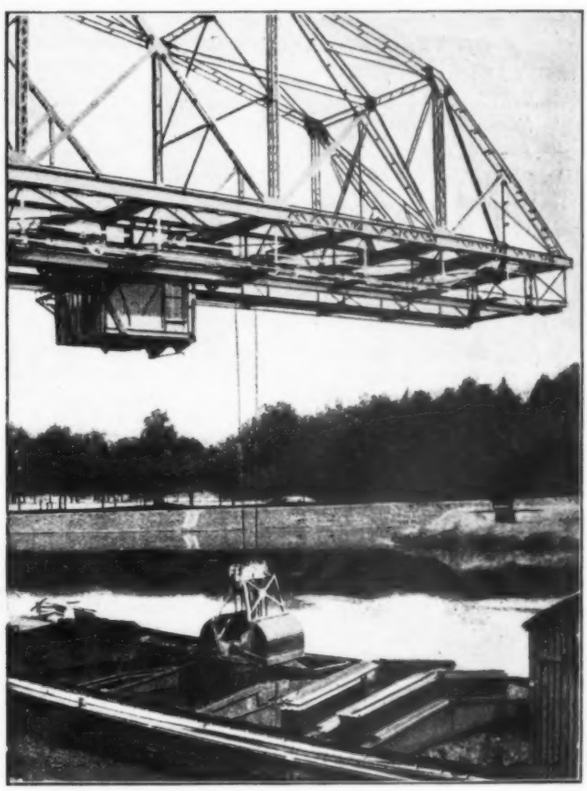


The Port of Strasbourg.

View of the Bassin des Remparts.

Another View of the Bassin des Remparts.

Coal-handling Bridge Crane, equipped with 5-ton Grab Bucket.



Operating Cab and Grab Bucket.

Device for loading Ore into Barges. The side-door ore wagons are lifted up the slipway to the required height, varying according to water level, and the ore let through the hopper and channels into the barge. East Bank of Entrance Harbour.

Ten-ton Gantry Crane.

The estimated cost per metre of quay is therefore less in the second scheme.

RHINE FLEET.

The Rhine fleet comprises 3,158 barges of over 750 tons capacity with an aggregate tonnage of 3,857,760 metric tons, and 230 tugs ranging from 500 to 2,000 h.p. of an aggregate horse power of 300,000 h.p.

Distribution of the 750 ton barges among the various countries is as follows:—

Belgium, 184; Holland, 1,134; Switzerland, 66; Germany, 1,443; and France, 265.

Seventy per cent. of the Strasbourg traffic sails under the French flag. The French fleet, owned by eight companies, has a tonnage of 358,000 tons with a total horse power of 32,000.

TYPES OF VESSELS CALLING AT STRASBOURG.

BARGES.

Displacement from 750 to 2,500 tons; length from 60 to 90 metres; breadth from 8.30 to 12 metres; draught from 2.05 to 2.6 metres.

RHINE CARGO BOATS.

Maximum length 80 metres; maximum breadth 9.7 metres; maximum draught 2.5 metres; load from 600 to 1,300 metric tons.

The average horse power is 650, and the vessels are generally propelled by twin screws.

TUGS.

Average length 70 metres; average breadth from 20 to 24 metres; the horse power is from 1,000 to 1,500. They are mostly propelled by paddle-wheels. The average metric tonnage towed per h.p. is 2.5 tons. As a rule a 1,200/1,500 h.p. tug will tow two barges with an aggregate tonnage of 2,500 to 3,500 tons.

TANK BARGES.

The average tonnage of these vessels is 1,200 metric tons. The largest tank barge is Dutch, with the following dimensions:—Tonnage, 3,008 tons; length, 117.05 metres; breadth, 13.58 metres; load draught, 2.72 metres. The Rhine vessels have high decks in order to give more accommodation for the crews.

TRAFFIC OF THE PORT.

Some idea of the increase in traffic is conveyed by the following figures, while full particulars are given on the diagram shown in the Supplement:—

1892, 11,000 tons measurement; 1896, 354,000 tons measurement; 1901, 570,000 tons measurement; 1911, 1,000,000 tons measurement; 1913, 2,000,000 tons measurement; 1926, 3,200,000 tons measurement. Import and export tonnages are respectively about two-thirds and one-third of those above.

The total tonnage is accounted for by the various commodities as follows:—Coal about 50 per cent. of total tonnage; grain about 25 per cent. of total tonnage; ores, potash and miscellaneous 25 per cent. of total tonnage.

STRASBOURG HINTERLAND.

The many rail and water connections of Strasbourg makes this port's hinterland a very large one. Some idea of its extent is shown by the fact that American grain is shipped via Strasbourg to all French flour mills situated within 250 kilometres of the port, as the ultimate cost of transportation via Havre or Dunkirk would be higher. The latter ports, which are 700 kilometres away from Strasbourg, are patronised by mills not more than 450 kilometres distant.

The Scientific Operation of Marine Boilers.

Some New Installations.

The rapid progress of the marine Diesel engine is engendering a realisation of the fact that much more scientific methods of operating "Scotch" marine boilers might be adopted, including furnace equipment, softening of make-up water, control of the firing by means of combustion recorders (swung from a gimball joint), and the use of feed meters, to mention a few examples.

Interesting in this connection as showing the possibilities for even the smallest vessels, as well as dock and harbour plants of one or two boilers, is that of a well-known shipping firm on the Yangtse River in China, with headquarters in Shanghai who some time ago fitted a set of "Turbine" forced draught steam jet furnaces on one of their ships, the s.s. "Tseang Tah," which has a three-flue cylindrical boiler.

The results have been so satisfactory that the ss. "Hain Tseang Tah," a second and sister ship has been equipped in the same way. In this case, the vessel has a modern type water tube boiler, and has also had the "Donkey" boiler fitted. Another field for economy on steamships generally is the fitting of such small boilers on proper lines, so as to be able to burn all the ship's cinders, instead of wasting coal, quite apart from trouble with black smoke.

A number of "Turbine" furnaces are also operating on dredgers in the Malay States in connection with tin mining, mostly using raw lignite as fuel, the ore being taken out of the river bed, while the same equipment has been supplied to Chilean ships in order to burn the difficult local coal, which is friable and high in sulphur. The saving, however, in comparison with oil firing is very great, and it may be mentioned that Chile, like many other countries, is determined to render herself much more independent as regards fuel generally. With this object there is now in operation at Valparaiso a Fuel Research Station, particularly in connection with low temperature carbonisation and the production of liquid fuel from coal. Another example of the world-wide interest in the science of fuel technology, and of the desire of most countries to render themselves more or less independent as regards vital products such as solid and liquid fuels.

Modern Coal Handling Equipment.

An Interesting Development in Great Britain.

Messrs. the Underfeed Stoker Co., Ltd., have now taken over the sole manufacture and selling rights in Great Britain and the British Empire of the "Beaumont" Mechanical Handling Equipment.

The field covered is extensive, and apart from docks and harbours, collieries and power station, other applications are steel works, cement works, gas plants, foundries, glass plants, sugar refineries and the handling of sand, limestone, crushed ore, and various other materials.

The "Beaumont" electric driven automatic skip hoist for coal and ash handling consists essentially of a steel bucket, overhead cable track and winch, the whole operation of the raising and lowering of the bucket from the ground level and the conveyance along the wire cable overhead being carried out by hand control on the ground, while the equipment includes a special magnetic brake, which holds the bucket dead-tight at any point in the travel, if for instance the electric current fails.

The "Beaumont" cable drag scraper for coal storage made in standard sizes from 20 to 600 tons per hour capacity, will take material off the pile or put it on as required, with an average haul up to 100 ft., utilising any area of site, circular, square or irregular. The essential principle is that of a large heavy steel bucket or scraper, which lies on the top of the coal pile, partly penetrating, and by means of an endless cable is caused to pass backwards and forwards over the entire surface, fixed to a tower at one end, and at the other a suitable post or, for large installations, a moving travelling carriage device running on rails round the outside of the entire storage area, clamped down at any desired spot. The whole arrangement is electrically driven, and the large travelling cable scraper rapidly pulls the coal off the pile or deposits it again from wagons tipped on to a dump, as worked by an electrically operated winding device, the attendant having full view of the pile, while the installation also includes a travelling skip hoist and the overhead tower mentioned with a chute.

At the present time there is being manufactured at the Derby Works, a complete "Beaumont" cable drag scraper equipment, having a capacity of 70 tons of coal per hour, and many advantages are claimed for this plant, not hitherto developed to any extent in Great Britain, as against telphers and cranes, steam or electric, especially as regards low capital and operating costs, simplicity and flexibility.

ALBERTA GOVERNMENT TO RETAIN PROVINCIAL RAILWAYS.

The Alberta Government has decided to reject the joint offer made by the Canadian National and Canadian Pacific Railways for the Edmonton, Dunvegan and British Columbia line in the Peace River District. This decision results from the refusal of the Canadian National Railways to make a second and improved offer for the Alberta and Great Waterways line, the Government maintaining its intention not to dispose of one line whilst retaining the other. The volume of business handled over the Edmonton, Dunvegan and British Columbia and Central Canada railway lines in northern Alberta during the first three months of the present year was more than twice as great as in the corresponding period of 1927.

Work on the 15-mile extension of the Central Canada Railway from Whitelaw is being proceeded with immediately and the contractors expect to have the work completed by the 1st of November. Commencement of the contract for the 25-mile extension of the Edmonton, Dunvegan and British Columbia Railway from Wembley awaits the passing of legislation at Ottawa authorizing the line.

The Port of Montreal.

The History and Facilities of a Great Inland Harbour.

By LAURENCE CHALMERS TOMBS, M.A.

(Continued from page 204.)

Following is comparison of ocean rates charged in the early months of 1914 and 1926 from Montreal to the United Kingdom:—

Rates in cents per 100 lbs. except where noted.

Commodity.	1914 (p)	1926
Sugar in bags	12c.	25c.
Automobiles	9.75 per cubic foot	25 per cubic foot
Apples in barrels	66	90 per barrel
Canned goods	20	50 (double strapped)
Rolled oats (cases) ...	16	40
Cheese in boxes	26.8	60
Flour	12	20
Oatmeal	12	20
Oil cake	12	20
Agricultural implements...	6.75 per cubic foot	25 per cubic foot
Packing house products ...	21.5	50 (ordinary stowage)
Butter	32.1 (ordinary stowage)	1.40 (cold storage)
Eggs	9 per cubic foot	30 per cubic foot
Newsprint	from 12s. 6d. to 17s. 6d. per ton of 2,240 lbs.	40

MARINE INSURANCE.

The marine insurance rates on cargo out of the St. Lawrence to Europe during the summer season are usually slightly higher than the rates out of New York. There is no rate agreement in existence between the underwriters so that these rates vary from 5 cents per $100, in the period from May 1st to October 15th, to 10 or 15 cents additional from October 15th until the official close of St. Lawrence navigation, which is November 25th. The rates on livestock or cattle out of Montreal are the same as from other ports. An indication of some of the open rates charged is as follows:—

	Per 100.00 dollars. Cents.
From Montreal to Liverpool: partial cargoes of grain	15
From St. John to Liverpool	15
From Halifax to Liverpool	15
From New York to Liverpool	12½
From Montreal to West Indies in bags	35
From New York to West Indies in bags	25
(Bermuda usually gets 10 to 15 per cent. discount as it is a shorter route than to the other ports and enjoys special advantages in New York).	
Live stock from Montreal to Liverpool	62½
Live stock from New York to Liverpool	62½
Steel from Montreal to Australia	100
Steel from New York to Australia	87½

Owing to the excellent aids to navigation on the St. Lawrence, insurance rates on hulls may now be obtained at rates slightly higher than out of New York on vessels of a similar size and class; in many cases this runs about £400 higher than New York. Special rates dependent on weather conditions are made for vessels and cargo from the St. Lawrence later than November 25th. It is interesting to point out that pilferage at the port of Montreal is practically nil, due to the co-operation of underwriters, Harbour Commission, and steamship companies. Various representations have been made to the Canadian Government, with the result that the rates from points like Halifax and Vancouver (if not St. John) have been placed on the same basis as United States ports.

PASSENGER SERVICE.

Montreal is fast becoming the favourite port of embarkation for Europe. The steamships are of special design and provide the last word in furnishings, fittings, service, comfort and safety. The voyage down the noble River and Gulf of St. Lawrence provides two days in sheltered waters, reducing by that period the time spent on the open Atlantic. The advantages of the route and the picturesque scenery in an historic setting combine to draw an increasing number of passengers from all parts of North America. The "Empresses" make the run in six days, and the cabin-class ships from Montreal take seven to eight days. Most of the freight boats have accommodation for a few passengers. The minimum summer fares are as follows: First class, $225.00; cabin (second) class, $145.00; tourist-cabin class, $95.00; third class, $82.50. To these must be added $5.00 per ticket for Canadian revenue tax, known as "war tax." The minimum for a round trip tourist third cabin, which has become very popular for conducted parties, is $165.00 plus $5.00 tax, and ordinary third class is $150.00 plus $5.00 tax, going and returning by the same line and class of ship. Inbound third class passengers must disembark at Quebec and pass through the hands of the immigration authorities, continuing to their destination by rail from Quebec.

(p) From Exhibit No. 80; Proceedings of the Committee, Ottawa, pp. 791-3, May, 1925.

The development and improvement of the service generally will be evident from a comparison of the Canadian Pacific Atlantic fleets of 1905 and 1925. In 1905 the total Atlantic fleet consisted of eight steamships against thirteen passenger vessels in 1925, and there is an even greater difference in the tonnage, as shown by the following table:—

Gross Tonnage of 1905 for Total Atlantic Fleet.

Name of Steamship	Gross Tonnage
Mount Temple	8,790
Montrose	6,278
Montreal	8,644
Lake Michigan	8,200
Montezuma	8,360
Lake Manitoba	9,674
Lake Champlain	7,394
Lake Erie	7,535

Tonnage of Atlantic Passenger Fleet Summer Season 1925.

Name of Steamship	Gross Tonnage
Empress of Scotland ...	25,150
Empress of France	18,350
Montnairn	17,300
Montroyal	15,650
Montcalm	16,400
Montrose	16,402
Montclare	16,400
Melita	14,000
Minnedosa	14,000
Metagama	12,400
Marloch	10,700
Marburn	10,750
Montreal	9,750

RAILWAY FACILITIES.

Montreal has an excellent train service with through cars to and from such centres as Vancouver, Winnipeg, Minneapolis, Chicago, Detroit, Buffalo, Toronto, Miami, Washington, Philadelphia, New York, Boston, Portland, St. John, Halifax, Chicoutimi, Rouyn, Quebec, Ottawa, and intermediate points; a comparison of the rail passenger fares to and from Montreal and to and from New York follows:—

From		To New York	To Montreal	From New York	From Montreal	To
Toronto ...	...	$17.96	$11.50			
				$19.49	$11.50	Toronto
Buffalo ...	s	— 15.82	15.17			
	d	— 14.29				
				s — 15.82	15.17	Buffalo
Cleveland	..	20.55	21.73	d — 14.29		
				20.55	21.73	Cleveland
Detroit ...	s	— 24.82	19.40			
	d	— 23.29				
				s — 24.82	19.40	Detroit
Chicago ...	s	— 32.70	29.21	d — 23.29		
	d	— 30.70				
				s — 32.70	29.21	Chicago
St. Paul ...	s	— 46.97	30.18	d — 30.70		
	d	— 44.97				
				s — 46.97	39.18	St Paul
Duluth ...	s	— 49.11	36.52	d — 44.97		
	d	— 47.11				
				s — 49.11	39.18	Duluth
Winnipeg	...	52.20	48.00	d — 47.11		
				s — 62.51	48.00	Winnipeg
Cincinnati	s	— 27.01	28.78	d — 25.01		
	d	— 25.01				
				s — 27.01	28.78	Cincinnati
St. Louis...	s	— 38.06	37.16	d — 25.01		
	d	— 35.56				
				s — 39.06	37.16	St. Louis
Kansas City	s	— 48 10	45.75	d — 35.56		
	d	— 45.60				
				s — 48.10	45.75	Kansas City
				d — 45.60		
Oklahoma City	s	— 57.59	56.56	s — 57.59	56.59	Oklahoma City
	d	— 55.09		d — 55.09		
San Francisco	...	108.90	109.05	s —111.40	109.04	San Francisco
Los Angeles	...	108.90	109.05	d —108.90		
				s —111.40	101.05	Los Angeles
				d —108.90		
Seattle ...	...	107.91	100.94	s —109.91	102.32	Seattle
				d —107.91		
Vancouver	...	107.91	100.94	s —109.91	102.34	Vancouver
				d —107.91		(q)

s—Standard. d—Differential.

A total number of 179,655 passengers of all classes were handled to and from Canadian ports in 1925. This shows an increase in the first class and cabin passengers, but a tremendous falling off in thirds on account of restricted immigration. In 1913 westbound first class passenger carryings were 12,745; second, 82,720; third, 272,752; and eastbound first class, 8,742; second, 30,440; third, 73,048. (r).

According to a report issued at Ellis Island on January 1st, 1926, by William C. Moore, Landing Agent, the Port of New York received in 1925 81,691 first class, 178,526 second class, and 172,011 third class passengers from 926 vessels, the majority of these passengers being carried by the Cunard Line.

RECORD APPLE SHIPMENT.

The largest quantity of fruit ever shipped from Tasmania in one vessel recently reached England when the Blue Star Freighter "Trojanstar" arrived from her first visit to Australia with 160,500 cases of Tasmanian apples. The previous record shipment of Tasmanian fruit was in 1921, when the freighter "Northumberland" carried 148,400 cases of apples.

(q) Fares by the courtesy of Lieut.-Colonel W. Maughan, Canadian Pacific Steamships, Ltd., Montreal.

(r) Figures obtained from Mr. L. S. Tobin, White Star Line, Montreal.

Shipping at New Orleans.

There were 266 ocean steamships of 957,530 gross register tons entering the port of New Orleans during the month of May, 1928, according to the records of the Board of Commissioners of the Port of New Orleans, of which 792,530 tons used the public wharves, and the remainder discharged or loaded at private facilities. These figures do not include vessels passing through the port. Departures were 248 vessels.

The movement of freight over the public wharves amounted to 358,658 tons of general freight; 2,370,242 bunches of bananas were unloaded by the conveyors. Steamship arrivals for May, according to nationalities, were as follows:

Arrivals.

	Number Vessels.	Gross Tonnage.
American	132	526,151
British	18	85,118
Brazilian	2	9,096
Belgian	1	4,984
Cuban	2	4,725
Dutch	3	19,692
Danish	11	30,769
French	4	29,643
German	2	8,792
Honduran	37	85,134
Italian	6	36,755
Japanese	1	7,297
Mexican	1	255
Nicaraguan	4	4,656
Norwegian	35	87,405
Panaman	3	2,004
Swedish	4	15,054
	266	957,530

During May, 823 vessels used the inner harbour navigation canal, aggregating 330,958 tons, an increase of 90 vessels and of 19,287 tons over the same month of 1927. North-bound the movement consisted of 50 Mississippi-Warrior Service barges and towboats of 18,699 tons, 28 ocean steamships of 100,737 tons using the Galvez Street wharf and industrial landings, and 338 other craft of 45,126 tons—total 416 vessels of 164,562 tons. South-bound, there were 51 Mississippi-Warrior Service barges and towboats of 20,294 tons, 26 ocean steamships of 105,408 tons, 330 other craft of 40,694 tons—total 407 vessels of 166,396 tons.

The records of the Board in respect to river craft show a large increase for the month of May, 1928, as compared with May, 1927. In that month there were 264 towboats, barges and steamboats arriving in the port, with 104,533 aggregate tonnage, which is an increase of 91 vessels and of 17,113 tons over the record of the previous May. Mississippi-Warrior Service towboats numbered 21, of 16,538 tons, a decrease of two towboats and of 4,751 tons; Mississippi-Warrior barges, 71, of 42,520 tons, an increase of 20 barges and of 5,169 tons; other barges, 79, of 24,480 tons, an increase of 47 barges and of 14,458 tons; steamboats, 93, of 10,955 tons, an increase of 26 steamboats and of 2,237 tons. These figures relate to arrivals only, as the Board does not compile records of departures.

Port Dues in Yugoslavia.

Prevailing Rates of Exchange.

The Department of Overseas Trade has received from the Commercial Secretary at Belgrade the following list of official rates of exchange for the payment of port dues in Yugoslavia during the month of June, 1928:—

	Dinars.
1 Gold Napoleon	218.90
1 Pound Sterling	277.30
1 American dollar	56.80
1 Canadian dollar	56.50
1 German mark (gold)	13.50
1 Belga	7.93
100 French francs	223.60
100 Italian lire	299.20
100 Dutch florins	2,291.60
100 Roumanian leis	35.15
100 Danish crowns	1,523.00
100 Swedish crowns	1,523.70
100 Norwegian crowns	1,521.50
100 Spanish pesetas	952.50
100 Greek drachmas	74.15

Personal enquiries regarding all shipping and transport matters should be made at the City office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

Launch of an Oil Tanker.

The twin-screw tank steamer "Adela," which has been built to the order of The Anglo Saxon Petroleum Company, Ltd., by Sir W. G. Armstrong Whitworth and Co., was launched from their Armstrong yard on May 21st. The launching ceremony was gracefully performed by Lady Barran.

The principal dimensions of the vessel are: length between perpendiculars, 305 ft.; breadth moulded, 50 ft.; depth moulded to main deck, 15 ft. The vessel is designed to carry 2,300 tons on 11 ft. 1½ in. extreme draft, and her speed on trial when loaded to this draft will be 10¼ knots. She is of the single-deck type, with poop, trunk and forecastle, and built on the combined longitudinal and transverse system of framing to Lloyd's highest class. She will have straight stem and elliptical stern.

The oil cargo is carried in five centre compartments and three side tanks on each side of the vessel. A cofferdam is fitted forward for the full width of the vessel. Accommodation is provided amidships for the captain, and for the other officers on the poop deck in steel houses. The crew's accommodation is arranged in the forecastle.

The oil fuel is carried in a bunker extending the full width of the ship, forward of the engine room. The vessel is electrically lighted throughout and is fitted with wireless installation. A steam windlass is fitted on the forecastle head.

A steam winch is fitted on the upper deck and a warping winch on the poop. A Wilson Pirrie steering gear is fitted on the rudder head on the poop. The cargo oil pumps are two in number, and the vessel is fitted with a complete double oil piping system. The vessel is also fitted with a ballast pump and drain pump.

The propelling machinery consists of direct acting triple expansion type engines with cylinders 13-22-35 by 24 in. stroke, the working pressure being 180 lbs. Two single-ended Scotch boilers are fitted. The machinery is being supplied by the Marine Engine Department of Sir W. G. Armstrong Whitworth and Co., Ltd. The "Adela" is the 155th oil tanker to be launched by Armstrong Whitworth.

INCREASE IN ALBERTA WHEAT ACREAGE.

According to telegraphic reports received up to Friday, May 25th, by the Alberta Department of Agriculture, wheat seeding was practically completed throughout the Province by that date and forty to fifty per cent. of coarse grain had been sown. There will be some increase in the wheat acreage over that for 1927, largely owing to the amount of land summer-fallowed and newly broken last year. Much of the success of the present season's crop depends on rain fall in the near future, as precipitation during the month of May was considerably below the average and the prevalence of high winds over a large part of the Province has greatly reduced the supply of moisture in the soil. Early sown crops on summer-fallowed land, however, are stated to be doing well.

TOTAL TRADE OF CANADA.

Total trade of Canada for the twelve months ended March, 31st, 1928, is valued at $2,359,412,763 an increase of $60,947,116 over the twelve months ended March 31st, 1927. Imports had a value in the period under review of $1,108,956,466, an increase over the previous corresponding period of $78,063,961 and exports $1,205,456,297 a decrease of $17,116,845.

The greatest volume of Canada's trade continues to be with the United States. The value of imports is placed at $719,455,954, which represent a Canadian per capita expenditure in the United States of over $70. Exports from Canada to the United States totalled $478,006,114, or only about $20,000,000 less than the value of Canadian exports to all the countries of the British Empire. Goods imported by the Dominion from British countries were valued at $249,080,052.

FIRST CANADIAN SHIP TO BURN PULVERISED COAL.

An undertaking considered to be of great importance in the efficient utilization of Nova Scotia coal is the equipping of the steamer "Lingan" at the Halifax Ship Yards, Limited, with pulverized fuel burning equipment. The "Lingan," a ship of 800 tons, owned by the Dominion Shipping Company, subsidiary of Dominion Coal Company, is engaged in the coal carrying trade between Sydney and Montreal.

The fitting of the "Lingan" with pulverizers, distributors and burners to utilize powered coal is stated to be the first installation of pulverized fuel burning equipment by private shipping interests in the British Empire, and follows quickly on the heels of the successful voyage of the "Mercer," a 9,500 ton ship operated by the United States Shipping Board, which recently completed a 7,000 mile voyage from Philadelphia to Rotterdam and back entirely on pulverized fuel.

The expansion of the use of pulverised coal on the water will be watched with lively interest and the feeling here is that the pioneer work being performed at the Halifax shipyards will open a new era of progress in Canadian and British shipping.

Harbour Engineering Notes.

PROCESS FOR SAND CAST PIPE.

A new method of making sand cast pipe has just been brought into operation at one of the leading American foundries which places the manufacture of sand pipe on a mechanical basis. It is claimed that the pipe so made has greater strength and less weight than pipe cast by the older methods. The new pipe is made in stationary horizontal moulds in green sand and with green sand cores. A patented device is used for centring the cores in the moulds, permitting the pipes to be cast while the moulds are in the horizontal position and without the necessity of drying either the moulds or the cores.

In the new process the same flasks are used over and over again, flasks, sand and cores each moving in its own separate path to the point of assembly, while the sand-handling machinery, ramming, core-making " shake-out " machines and a battery of overhead cranes work together as one unit. As soon as the moulds are ready they are taken to the casting zone. Several lengths of 16 ft. pipe are poured in one operation, followed immediately by core-bar pulling machines, the mechanical " shake-out " and the return of the flasks to the sand-handling plant for immediate further use. At present the pipe is being made in 16 ft. lengths, and sizes soon to be placed on the market, will range from 4 in. to 12 in.

REFINEMENTS IN BOILER HOUSES.

Of the many aids to power plant economy during the past few years, two of the most useful are the flow meter and the draught gauge. By means of the former a complete record can be obtained of the amount of steam generated and supplied to the various departments, the quantities not only being indicated at the time the steam is being generated, but the indications are traced on circular charts so that a record of steam consumption can be preserved for purposes of comparison.

For measuring steam and other fluids in large quantities the most satisfactory method is the flow principle, which consists in setting up a differential pressure which varies in a definite and known relation to the rate of flow, and measuring this differential pressure in terms of weight or volume. In the latest type of flow meter employed in boiler houses the differential pressure is set up by an orifice in a thin plate in some convenient part of the piping, the plate being made on monel metal when steam is measured. The pressures on the inlet and outlet sides of the orifice are applied to the interior and exterior respectively of a mercury sealed bell, which moves as a frictionless piston, being so shaped that the motion is directly proportional to the rate of flow.

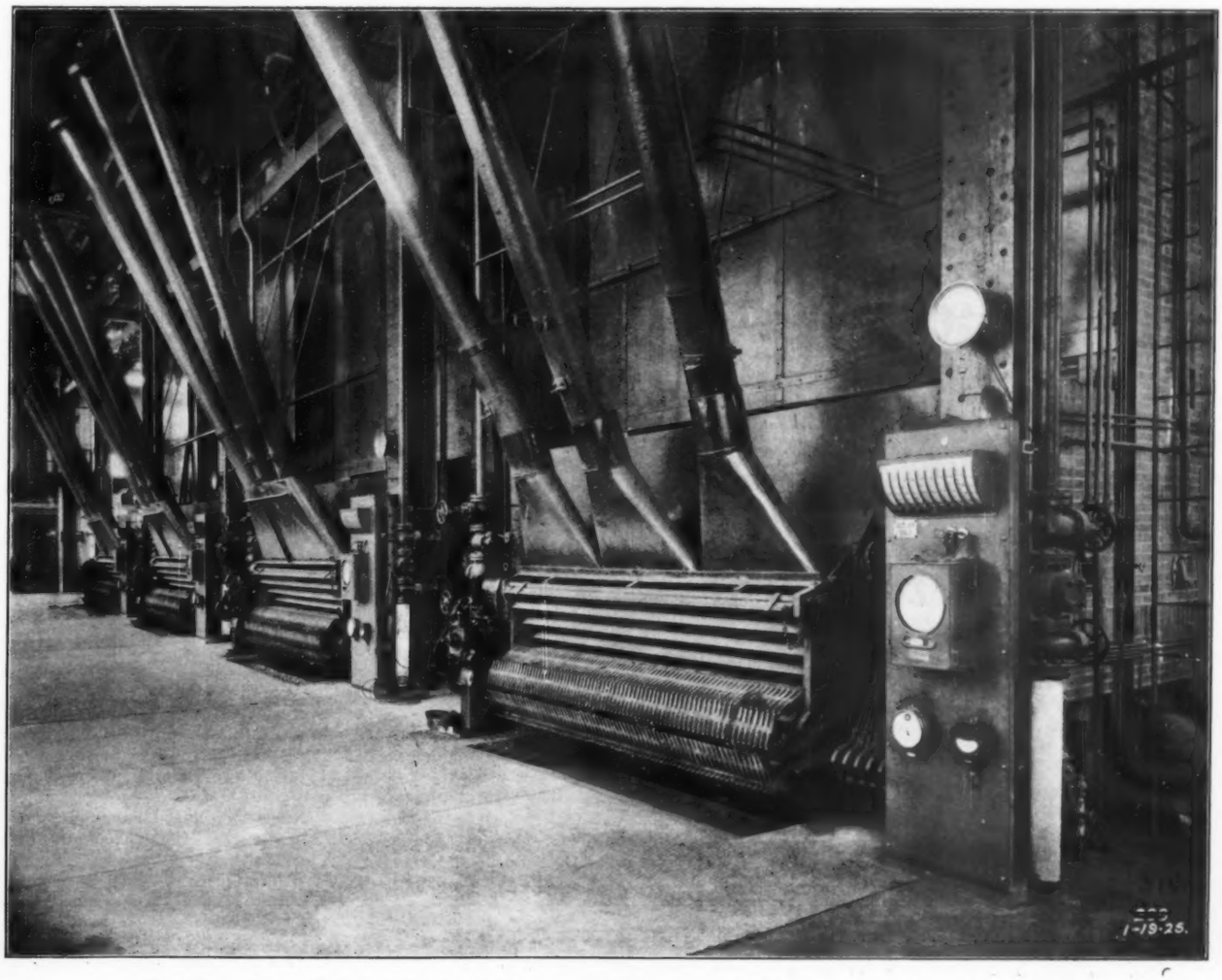
The adoption of such a principle makes possible a direct-reading, uniformly-graduated chart, and the operation of an integrator without cams and other troublesome mechanism. This principle is sometimes employed only to measure the total flow, but it is often important to record the rate of flow continuously so that it is possible to ascertain at any time whether certain conditions are being maintained or not.

Another good investment for up-to-date boiler houses is the draught indicator. To obtain maximum boiler economy and capacity the boiler room attendants should have a complete graphic record of the draught conditions at each point in the travel of the air through the boiler. Furnace draughts must be maintained within such very narrow limits that the recorder or indicator used must, to be of any value, be accurate to 0.01 in. of water. The divided windbox, used in some types of underfeed stokers and in all types of forced draught chain grate stokers, requires, to obtain satisfactory working, individual draught reading from each compartment. Draught readings from other points in the gas passages are very valuable when they can be accurately recorded and this can be done by the multi-pointer gauge.

Such a gauge may have as many as twelve pointers assembled in a single casing, and it may be used to record pressures up to several hundreds of pounds. The entire set of indicating gauges and instruments of any elaborate instrument board can be combined into one compact, self-illuminated multi-pointer gauge. Both the steam flow meter and the multi-pointed draught gauge can, of course, be installed on a panel, together with any other boiler instruments, in such a position that they are always easily seen.

WELDED ENGINE SEATINGS.

Since the M.V. " Fullagar " first demonstrated the possibilities of welded construction as applied to shipbuilding, considerable progress has been made in this form of construction, not only in the welding of hulls but also in dock repairs, as already reported in these columns, and for welding engine seatings in motor vessels. It will be recalled that the original " Fullagar " was fitted with a Camellaird-Fullagar engine,



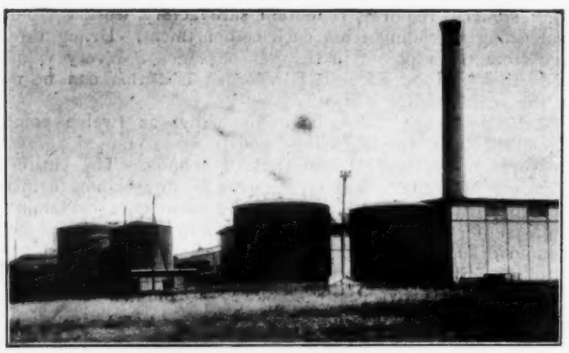
Chain-grate Stoker Boilers with Bailey fluid meter and multi-pointer draught gauge mounted on adjacent panel.

which developed 500 b.h.p., the seatings of the engine being welded with Quasi-Arc electrodes and the electric process.

This engine was later replaced by a Beardmore semi-Diesel engine developing about 320 b.h.p., but the welded seatings were satisfactory for both engines, and the effects of vibration were reduced to the minimum; this applied also to the auxiliary machinery seats. A set of welded motor seatings was later built into the motor yacht "Llys Helig," which was fitted with a pair of Kromhout semi-Diesel engines. Her engine seats, like those of the "Fullagar," were electrically welded, using the same type of electrodes, with the result that the marked absence of vibration was the subject of very favourable comment during her trials. The seating of the two-cylinder petrol-paraffin lighting set of this yacht was also welded with equally good results.

LIQUID FUEL STORAGE.

During recent years the fuel oil requirements of Sulzer Bros. have greatly increased, owing to the large number of Diesel engines that have to be tested, and various kinds of crude oil are stored as well as gas oil, tar oil and tar. The different



View of Oil Fuel Installation.

qualities of oil entailed the erection of a number of storage tanks, and on account of the lack of transport facilities, it was also necessary to provide a number of railway tank wagons. The storage capacity was in consequence increased to 603,000 gallons, while four tank wagons of 17,600 gals., capacity were obtained for transportation purposes.

The five main fuel storage tanks are shown in the photograph and are situated at Oberwinterthur. In the new equipment the intermediate tank placed under each of the main tanks makes it possible to examine and analyse each consignment of oil on delivery, and, if necessary, supplies can be drawn for testing on the engines before it is finally pumped into the main storage tanks.

The arrangement is shown in the diagram. The fuel arriving by rail in the tank wagon 1 is run into the intermediate tank 4, which has a capacity of over 4,400 gallons. After being tested and found satisfactory, it is pumped by the centrifugal pump 3 into the main tank 5. If desired, it can also

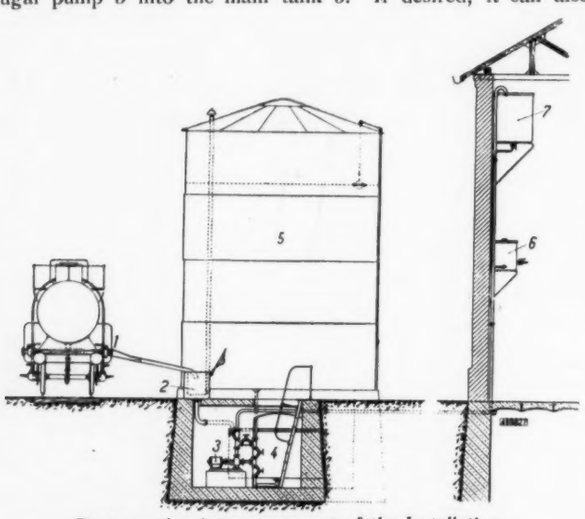


Diagram showing arrangement of the Installation.

1. Tap on tank waggon. 2. Filling funnel and filter. 3. Centrifugal pump. 4. Intermediate tank. 5. Main storage tank. 6. Service tank. 7. One-day storage tank.

be pumped into the daily storage tank 7 or the service tank 6.

The tanks for storing tar, tar oil and viscous mineral oils are fitted with heating coils to enable the fuel to be warmed up before use, especially in winter.

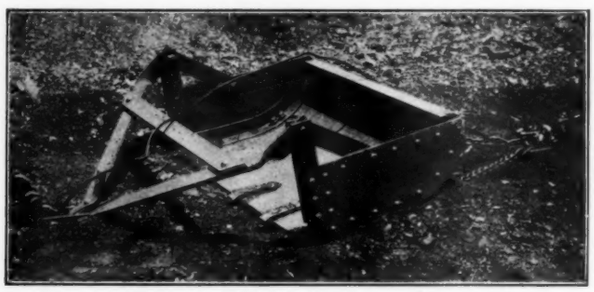
STORAGE BATTERY LOCOMOTIVES.

Storage battery locomotives have proved very serviceable for various industrial purposes, especially for underground and surface haulage in mines and for dockyard, quarry and similar work. Until recently, however, the possibilities of this type of locomotive had not been considered for service on normal gauge lines. Tests carried out on the Chicago and North Western Railway recently, however, have shown that the storage battery locomotive is likely to become a useful factor in railway operation.

The locomotive employed in these tests weighs 110 tons and is propelled by an Exide Ironclad battery weighing about 40 tons, and is capable of hauling a 1,500 ton train at an average speed of ten miles per hour. It is expected that this locomotive will be a valuable aid in solving some of the traffic handling problems at the congested termini in America in that it is noiseless and smokeless in operation and it can get a heavy load under way much more rapidly than other types of locomotive. The fact that the locomotive is an entirely self-contained unit is of great advantage in shunting and other work at termini. The propelling equipment consists of four motors and a battery of 120 cells, with a capacity of 616 K.W.H., two-speed electro-pneumatic control being employed.

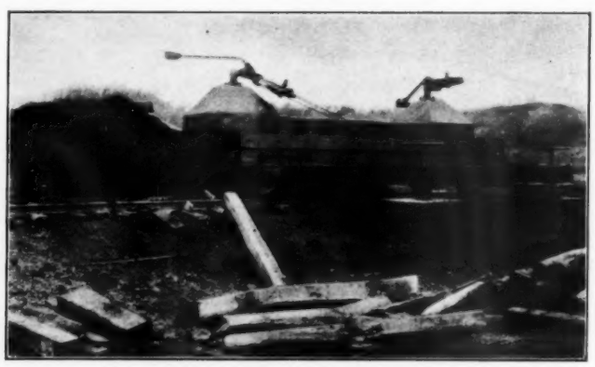
PULLING RAIL TRACK SPIKES.

A pneumatically-operated railway track spike puller is one of the latest items of equipment for the permanent way engineer. This machine can be handled by one man and is claimed to



Beaumont Cable Drag-scraper for Coal Storage.

pull from eight to ten spikes per minute, while it can be lifted and carried from sleeper to sleeper by one man. The machine works by turning a throttle to admit air on top of a plunger. As the plunger moves downward it actuates a link mechanism, which opens jaws on the lower end. With the jaws open the



Winch in use for hauling Timber.

machine is placed over the spike and a foot rest is placed on the lower flange of the rail. By rotating the throttle air is admitted beneath the plunger. As it rises the jaws close under the head of the spike, upward movement of these jaws taking place only after they are firmly clamped to the spike, which is quickly extracted.

PROGRESS OF ARC WELDING.

Arc welding to-day is in a vastly different position from what it was a few years ago. Shipbuilders and ship-repairers now realise that much time can be saved by employing electric-arc welding in place of riveting in very many cases. Improved methods and materials are being introduced day by day, and it is only rarely that any metal part cannot be repaired so that it is in as good a condition as it was before the breakage occurred. In many cases a part which was originally on the weak side can be reinforced during the welding process.

The contract for the electric-arc welding equipment for general work on the new floating dock just completed on the Tyne for the Singapore Naval Base was entrusted to Alloy Welding Processes Ltd., of London, who have a considerable experience in constructing welding plant for use in tropical countries. The machine in question consists of a central motor driving two "A.W.P." patent generators of their well-known self-stabilising, drooping characteristic type. The motor and generators, together with all the necessary control gear, are mounted on a substantial bedplate having small wheels,

the whole forming a self-contained portable unit which can be readily moved from one position to another on the dock. The machines, of course, had to comply with the special Admiralty rating and it is understood that they passed their tests satisfactorily.

Not only in shipbuilding and ship-repairing establishments, but on board large and important ships, welding plant is invaluable. The possession of arc-welding plant and equipment aboard, together with a trained operator, in cases of emergency would render a vessel to a great extent independent of shore repair shops. In view of this fact, it would be well if one of the engineering staff on such vessels were trained to become an expert welder, thus saving time and expenditure. It might be argued that only comparatively small parts could be welded. This, however, is not so. There is no reason why a fractured crankshaft or a main shaft should not be satisfactorily welded, or put into a condition which would enable the ship to proceed at reduced speed. Fractures which occur in boiler furnaces or combustion chambers, or corrosion of boiler plates, could be very easily made good. A multitude of other parts which cause a deal of trouble in ordinary circumstances could also be very quickly made fit for service.

Improvements at Stettin Harbour.

By Dr. ERNST OLDENBURG, Stettin Port Association.

It is stated from the official publications concerning the seagoing traffic of the German ports on the Baltic in 1926, that the Port of Stettin is improving more and more. Deducting the ferry-boats' traffic between Rostock—Warnemuende and Gjedser (Denmark), and between Sassnitz and Trelleborg (Sweden), the traffic at Stettin—as regards the net register tonnage of ships arrriving and leaving—amounts to more than a half of the total German traffic on the Baltic which comes up to 17,355,000 net registered tonnage (arrivals plus departures). The ferry-boat traffic at Sassnitz and Rostock chiefly serving the passenger traffic amounts to 7,003,000 net registered tons. The balance of 10,352,000 net registered tons traffic at Baltic Ports is made up as follows:—

Stettin, 5,517,000 net registered tons; Luebeck, 1,679,000 net registered tons; Koenigsberg, 1,418,000 net registered tons; Kiel, 1,098,000 net registered tons; Flensburg, 273,000 net registered tons; and Swinemuende, 267,000 net registered tons.

This favourable development of Stettin's traffic is even more distinctly shown by comparing the goods-traffic at Stettin in 1926 with that of the other German ports on the Baltic. The total goods-traffic (i.e. import plus export) was as follows:—

Stettin, 5,799,000 net registered tons; Koenigsberg, 1,884,000 net registered tons; Luebeck, 1,460,000 net registered tons; Kiel, 470,000 net registered tons; Rostock, 440,000 net registered tons; Sassnitz, 227,000 net registered tons; and Flensburg, 206,000 net registered tons.

Having regard to this important volume of trade at the Port of Stettin, improvements are constantly in full swing in order to meet the requirements of, in an up-to-date manner, traffic, and several important decisions respecting the prosecution of future improvements have been made. Since the Prussian State and the town of Stettin became joint owners of the harbour (1923), it has been easier to raise funds for the more pressing improvements. A scheme was already drawn up before the war, and hitherto it has only been stopped by lack of funds.

As to construction in 1927, three new transporter bridges in the Reiherwerderhafen were opened to traffic. These have a lifting capacity of 15 tons each, and are available both for transhipping cargo ex steamer to barges and for loading or unloading ex steamer to quay, and *vice versa*. These new arrangements chiefly benefit the German-Swedish ore trade but they are also suited to the German-English transhipment of coal, and they allow rapid transhipping at moderate charges to be ensured.

The execution of the new building for transhipping and warehousing purposes on the east quay of the west basin in the free-port has advanced so far that it will be opened to traffic towards the end of next year. It is a five storied building situated on the quay with railway tracks laid along both sides. It will be used both for transhipment and warehousing purposes. In order to make the storage of goods independent of transhipping operations, this building is equipped with roof cranes which can deal with the goods on both sides of the building, besides the usual quayside installations.

Dredging is continually going on in order to bring the Stettin —Swinemuende fairway to 8 metres, and a further deepening up to 10 metres is planned.

A supply of RM 14.6 millions has been voted for a further phase of the harbour improvement programme, the whole plan comprising five periods. A cutting aiming at the shortening of the fairway to the Reiherwerder Harbour and intended for the transhipping of bulk cargoes, such as ore and coal, is to be dredged from the River Oder to the above mentioned harbour district. This cutting is the so-called "Swante-cut" and the estimated cost amounts to RM 3.86 millions. Another improvement of the fairway of the River Oder is planned by a cutting from the West Oder to the River Parnitz, the expenses of which are estimated at RM 750,000 millions. The River Parnitz, a tributary of the West Oder, presently branches off from the Oder in an abrupt turning which is a hindrance to inland navigation. This cutting regulates the rise of water levels within the harbour, and it is hoped to get new berths by this improvement. This work is very urgent and is to be executed first and foremost.

Stettin was already before the war the most important German transhipping harbour for East European corn. The need for the construction of an up-to-date silo has been voiced for some years. Many rival harbours, with a smaller transhipment trade in corn have meanwhile erected large silos, Stettin is now to build silos at a cost of RM 6.24 millions.

The oldest part of the harbour, the Dunzig enjoys an especially good traffic but its arrangements need to be modernised. New sheds are to be built, and new electric cranes are to be put up to cheapen transhipment. Hitherto only hydraulic cranes have been available on the Dunzig quays which were built in 1878. A supply of RM 2.82 millions was voted for these necessary improvements.

The transhipping traffic in the Reiherwerder Harbour has progressed well during late years and it has been decided to lengthen the quay by 150 metres, an extension that will serve to make the most of the existing transhipping arrangements. This extension calls for an expenditure of RM 1 million. It is hoped to accelerate the transhipping of the bulk cargoes after its achievement which will be a great advantage to traffic.

The exact date of the completion of these plans cannot be predicted. Plans have, however, been fixed and supplies voted for their execution. The Prussian Ministry has presented the Council of State a legislative project concerning subsidies ready for further improvements of the Harbour of Stettin. This law authorizes the Ministry to employ the amount of RM 10.730 millions, according to a scheme which is to be fixed by the Minister of Commerce and Industry, while the Minister of Finance is authorised by this law to raise funds by loan. The balance of RM 4 millions is to be furnished by the Municipal Authorities of Stettin, decisions to this effect having already been submitted to the Town Council.

This expenditure is based, not only on the outstanding needs for improvement, but also, and chiefly, on the hope of strengthening the economic life of East Germany. This has been extremely depressed by the political re-casting following the Treaty of Versailles. Important parts of Stettin's hinterland, such as the Province of Posen and the industrial territory of East Upper Silesia are separated from this hinterland, and energies are directed to preserving Stettin's position as the largest port on the Baltic. It has achieved a lead in the course of centuries and it is hoped that the improvement of its harbour plant and technical equipment will enable it to maintain its position.

The Junior Institution of Engineers.

Application of Electricity to Domestic Purposes.

The problems relating to electrical wiring installations were referred to by Mr. F. C. Dain in a lecture to the Institution on May 4th, on the subject of "The Application of Electricity to Domestic Purposes." The lecturer said that the considerable financial outlay involved in an installation had led to various hire and hire-purchase schemes, generally known as assisted wiring schemes. There was little to choose, he said, between a simple hire arrangement in which something extra was paid per unit of electricity consumed, and one in which a fixed periodical charge was made based on the number of points installed. Each arrangement had its relative advantages and it was chiefly a review of local prevailing conditions which was the deciding factor. The advantage of the hire-purchase arrangement from the point of view of the consumer was, of course, that after a certain number of payments the installation became his property. In one particular area, out of 200 installation agreements, about two-thirds were for hire-purchase and one-third for simple hire.

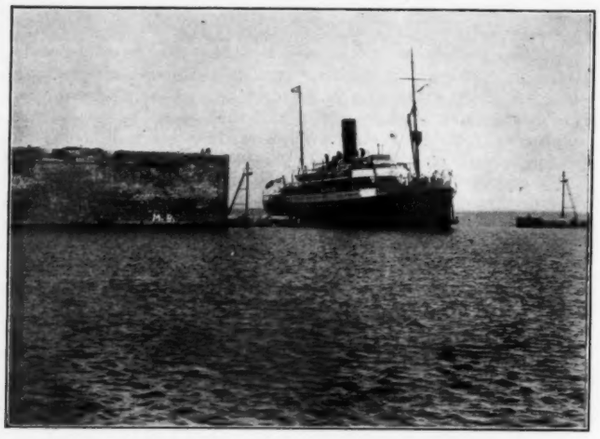
Mr. Dain gave details about selling electricity in small property areas, and said that he had found it almost impossible to sell opal lamps to working people; they insisted on having a lamp which "did not keep the light in" and were unimpressed by comparative demonstrations. He said that the number of premises in which the hirer was merely the tenant reached a high proportion, but owners rarely refused permission for the installation upon the supply authority's undertaking to make good any damage done in fixing, repairing or removing.

OPENING OF NEW WORKS AT ANTWERP.

A notice has appeared in the local press to the effect that the Kruisschans Lock a new "Bassin-Canal" will be opened by His Majesty The King of the Belgians on his return from his present visit to the Congo, namely on August 31st next.

Cargo Handling on the West Coast of Africa.

In England, where there are such abundant facilities for safe harbourage and for the expeditious handling of cargoes from inward bound liners, we often overlook the fact that at some of the outposts of the Empire from which come huge



Beach at Accra, West Coast of Africa, showing Surf Boat landing at Elder Dempster Sheds.

quantities of raw material and foodstuffs, the transference of goods from the hinterland to the beach for shipment is a very laborious process. Mechanical appliances are few in number, and much of the toil has to be undertaken by man power.

We reproduce a rather graphic photograph of the beach at Accra on the West Coast of South Africa showing how produce (cocoa) is brought by motor vehicle from up-country and deposited on the beach for shipment by homeward bound steamer. The Elder Dempster liner is to be seen in the bay some distance from the breakwater, which is in alignment with a series of sheds near the Company's offices.

Quantities of cargo are taken aboard at some of the West Coast places of call from small craft which are hauled from the rivers by motor boats, which are carried on all the West African lines. On reaching a coast port, the motor boat puts off for the shore to receive traffic reports and sometimes to travel up-river to bring to the sea-board, barges and other cargo carrying craft.

Primitive Method of crossing a River. River Prah at Beposo.

At the annual meeting of the shareholders of Elder Dempster and Co., Ltd., reference was made to harbour improvements on the West Coast of Africa. It was stated that the conception, construction and completion of Takoradi deep water harbour is an example of practical and far sighted wisdom on the part of British colonial administrators at home and in West Africa, and the opening of this great new port should assist the further development of the Gold Coast, notwithstanding the fact that the cost of the harbour was considerably more than had been anticipated. The work of discharging and loading ships at open ports on the Gold Coast has always tended to retard the flow of trade and the provision of a harbour where ships will be able to lie in smooth water and thus work their cargo under better conditions, has always had the Company's support. Takoradi harbour should be ready to receive ships for loading and discharging in July, but some time must necessarily elapse before full working is reached and the neighbouring port of Sekondi is closed, whilst it may be a few years before several of the smaller ports on the Gold Coast are closed and work is concentrated at Takoradi. The Central Province Railway, which is now completed, will be affected by the decision to leave open the smaller ports which were originally intended to be closed after the opening of Takoradi, and the authorities are faced with the problem of road transport in competition with this railway. The harbour scheme at Apapa is almost completed and it is hoped that, in due time, as more experience is gained, vessels using this port will obtain quicker dispatch and derive full benefit from the advantages which the new port works should be capable of affording. The Company gave evidence before the Imperial Shipping Committee in the course of its recent inquiry into the possibility of improving the harbours and main ports on the West African Coast, particularly at Lagos and Port Harcourt. It was hoped that the Committee's investigations will result in another step forward in the direction of providing better facilities for shipping and deepening the draft of water on the various shallow bars on the West Coast of Africa.

Port of Grimsby.

Opening of New Bridge at Alexandra Dock.

The 19th of July will be a red letter day for Grimsby when the Prince of Wales will visit the port to open a new bridge across the Alexandra Dock. The bridge will be of the latest pattern and is known as the bascule type and is similar to those at Keadby, near Scunthorpe, at Chester, Dublin and Carmarthen. By the pulling of a lever the massive structure which is capable of carrying the heaviest of traffic, can be raised to the perpendicular in order to permit the shipping in the dock to pass through. The building of the foundations of the bridge was a big task, for it was necessary to sink down to 35-ft. below the level of the dock. This work occupied a considerable period and at the time, so slow did the work seem to progress, that Grimbarian began to chafe against what they considered unnecessary delay.

On the other hand the later stages have progressed at a rapid rate. The huge leaf—as the movable portion is termed—grew in height day by day for it was built in the perpendicular. The time when the last bolt was driven home was anxiously awaited by the engineers and to their great satisfaction the leaf, when it came to rest, was within an eighth-of-an-inch of its true position. In case of failure of electrical power by which it will be worked, the bridge can easily be operated by hand power. The leaf, being in a state of balance at all angles of the lift, requires very little power to operate it and the final balancing has been brought to such a degree of accuracy that it is a comparatively simple matter for two men to move it by means of a hand winch. The bridge has been built by Sir William Arrol and Company, Limited, of Glasgow, who have undertaken similar work all over the world.

Book Reviews.

"The Concrete Year Book, 1928."—Edited by Oscar Faber, O.B.E., D.Sc., M.Inst.C.E. and H. L. Childe. London: Concrete Publications, Ltd., 20, Dartmouth Street, S.W.1. Price 3/6 net.

This annual has been enlarged to no less than 554 pages, and is claimed to contain all the information of every-day use to all concerned with concrete, whether engineers, architects, builders, foremen, or clerks of works. An idea of the contents of the Handbook Section will be gained from the following resume of its contents:—Notes are given on methods of making the strongest concrete with a minimum of cement, and methods of testing cement on the site are described. Then follows a series of chapters notable for a number of tables from which practically any type of structure may be designed. These include tables for the design of slabs for various spans and loadings; floor and roof loads; loads of walls and foundations; wind, earth and foundation pressures; sizes and reinforcement of footings for various pressures; loads carried by joist-concrete floors over different spans; sizes and reinforcement of beams to carry stated loads on varying spans; specifications for various types of floors and granolithic; specification for concrete roads; designs and tables from which the cost of different size water towers may be seen at a glance; designs for steel-trough and concrete road bridges; specifications for surface treatment, precast concrete, etc. A chapter of memoranda and a complete bibliography of books on concrete is included.

Then follows a complete Directory of concrete and allied trades, classified under various headings and embracing every firm engaged in or catering for the concrete industry. A list of trade names is included.

The final section is a Catalogue, illustrating and describing the business or products of 250 firms engaged in the concrete industry; this should be valuable to those selecting firms for special work or machines or products for a special purpose.

The price this year is increased to 3/6, but the size of the volume is enlarged by over 100 pages, with a corresponding increase in its usefulness.

Port of Southampton Topics.

THE RUSH SEASON.

Southampton is now in the throes of its busiest season and the activity in Dockland is feverish in its intensity. This is the height of the East-bound Atlantic season during which thousands of Americans are landed at Southampton to begin their hustle tours of Europe or their business calls in this and Continental countries. The staff in the shipping company's offices are working overtime to keep pace with traffic that bids fair to set up remarkable figures. During June, 41 ships left the port for America and 18 arrivals from New York were recorded. Only on five days was there no inward or outward vessel on the New York service. On some days a veritable " bunch " of movements took place. On June 16th, for example, the tonnage of the ships handled amounted to 264,265 tons. The majority of these passed both inward and outward on the same day so that the total tonnage approached 400,000 tons. During the morning vessels docked at almost fifteen minute intervals. The season lasts into the middle of July and is followed by a lull before the homeward traffic begins.

CROSS-CHANNEL CARGOES.

The cross-channel potato traffic which has its centre at Southampton reached its height during June and from the information available it is apparent that the amount of trade done at the port in this connection was considerably in advance of that of last year. The Southern Railway Company, with seven cargo steamers having Southampton as their home port, find this number quite inadequate to cope with trade during the busy season and six additional vessels were this year chartered at the beginning of the season to assist in carrying the traffic. Daily services ran from Jersey and St. Malo throughout the season. More than 1,000,000 packages of new potatoes are received from Jersey and St. Malo each year and they are distributed throughout the Midlands, Wales and the whole of the South of England. The Guernsey tomato trade which was also in full swing during the month is always of considerable benefit to the port. Shipments begin in May and will continue to September. There are indications that the present season will be a particularly busy one throughout. Over 1,000,000 packages of tomatoes were sent from the island in 1927 and in that year the shipment of these together with flowers, beans and grapes totalled 2,170,852 packages. The Guernsey grape traffic has proved a valuable one of recent years, but with the tendency of growers to cultivate tomatoes instead, the grape shipments are expected to decrease. The Channel Island flower trade has been particularly good this year and during the first week of June a record cargo of 4,000 boxes of irises were discharged at Southampton.

THE TWIN TIDES EXPLAINED.

The double tides at Southampton which have always proved a source of interest to students of natural phenomena and which at the same time are recognised as one of the foundation stones of Southampton's prosperity as a port, are interestingly dealt with by Commander J. A. Rupert Jones, hydrographical surveyor to the Southampton Harbour Board, in his informative volume, " Tidal Research," just published. " During the years 1920-1925," he says, " a continuous study of the tides at Milford Haven gave definite results, which were not clear until it was my duty to examine the cause and effect of the twin tides at Southampton. This led to the following note being inserted in the map accompanying the Southampton Harbour Board time-table for 1928: Note on tides: In the Solent and Southampton Water there are two high tides following each other in succession, causing a high tide period of about four hours. This phenomenon is caused by that portion of the incoming tidal wave from the Atlantic, which, rounding the North coast follows down the East coast of Great Britain and passes westward through the Straits of Dover, meeting between Southampton and St. Malo, France, that portion of the next incoming tidal wave from the Atlantic which has entered the English Channel." Which means that the first high water at Southampton was derived under it at the time of the immediately preceding upper or lower transit of the moon, and that the second high water originated still earlier by one transit of the moon.

CONTINENTAL CALLERS.

An interesting feature of the trans-Atlantic activities during June was the inauguration of the new North Peruvian Lloyd service. The vessels allocated to this service are to call at Southampton both outward and homeward, whereas in the ordinary course the east-bound ships call at Plymouth. There are to be two sailing in each direction each month, generally, so that the innovation will mean four additional calls being made at Southampton every month. The North German Lloyd are also engaged in a scheme for short trips between Bremen and Southampton. Visitors to this country have had in the past to return via Plymouth, which is considered hardly as convenient a port in this respect as Southampton. With vessels frequently visiting Southampton in connection with the new " two-way " service mentioned, facilities are being provided for trips to England with Southampton as the port of destination and departure. Whilst on the subject of Continental enterprise and its effect on Southampton, reference may be made to the Holland-America line's new 30,000 ton liner " Statendam," which will join the Southampton service in the Spring of next year. A feature of its accommodation is the lavish manner in which " tourist third " passengers will be catered for. It has been arranged for each of the cabins in this class to be supplied with running water, hot and cold, and, it is claimed, the " Statendam " will be the first liner of its size to give this advantage to the third class. The " Statendam " will be the largest of Holland's mercantile marine vessels. The " tourist third " accommodation is aft and quite separate from the emigrants and third class, who have accommodation forward.

A fall in all inward totals is shown in the Dock statistics for May but this is more than counteracted by the increase in many of the outward totals. The number of vessels inward dropped, as compared with May, 1927, from 299 to 292 and outward from 301 to 300. The inward gross tonnage fell by 5,265 tons the respective totals being 1,447,801 against 1,453,126. The outward total was, however, higher than that for the corresponding period last year the total being 1,475,378 compared with 1,430,882 tons. The net tonnage inward fell by 2,985 tons the respective totals being 757,823 tons and 760,808 tons. The outward tonnage increased from 746,901 to 772,442. The cargo handled during the month was 45,412 tons inward against 55,151 tons last year, and 47,424 tons outward compared with 42,168 tons. Passengers landed totalled 18,267 against 19,198 in May, 1927, but outward the total was 18,840, an increase of 1,353.

DREDGING PLANT SOLD.

The James Dredging, Towage and Transport Co., Ltd., of London and Southampton, have recently sold from their dredging fleet at Southampton a number of vessels, including the self-propelling bucket hopper dredger " Devon," for work at Casablanca; the new steam hopper barges " Foremost 26 " and " Foremost 27," to Brazil; the powerful suction and reclamation dredger " Riparian " and the bucket dredger " Gymp," for work in Holland on the Zuider Zee; the bucket dredger " Clearer " and the towing hopper barge " Sibtonia," to Dutch purchasers; the bucket dredger " Venezia," to Poland; the self-propelling 1,000-ton pump hopper dredger " Foremost 25 " and the self-propelling grab hopper dredger " Clayford," for work in the Congo River, West Africa; a new single-screw tug of 900 i.h.p., " Foremost 42," to the Dublin Dock Board; and the new powerful self-propelling grab hopper dredger " Clearway " to the Whitehaven Harbour Commissioners, Cumberland. Larger and more powerful vessels than any of the above are now completing in Scotland, and will be engaged on the large new dock scheme at Southampton, a contract in connection with which, it will be remembered, the James Company recently secured in the face of world competition.

THE RIPARIAN.

The sale of the suction and reclamation dredger " Riparian " is of more than passing interest, for the reason that the vessel was employed on the reclamation of the 18 acres of land in the vicinity of the Royal Pier and Train Ferry Jetty, Southampton. After experience on this job the " Riparian " was found to be not sufficiently powerful to undertake the contract which has just been secured by her owners, and a more powerful dredger is therefore being constructed.

TRIALS OF THE " WATERTON."

The single-screw Canadian lake steamer " Waterton," built to the order of Mathews Steamship Co., Ltd., of Toronto, by Sir W. G. Armstrong, Whitworth and Co., Ltd., at their Armstrong Yard, Walker-on-Tyne, completed her official trials at sea with satisfactory results on the 28th May.

The vessel and machinery were built under Lloyd's survey for their highest class. The " Waterton " has a length overall of 259-ft. 6-in. with a moulded breadth of 43-ft. 6-in., and is designed to carry about 2,350 tons deadweight.

The propelling machinery was manufactured and installed by the Marine Engine Department, of Sir W. G. Armstrong, Whitworth and Co., Ltd., and consists of a set of triple-expansion, surface condensing engines of the most modern design.

Steam is supplied by two centrifugal multitubular single-ended boilers, coal fired, working at a pressure of 200 lbs. per sq. inch, and are fitted with patent fan draft system, with the latest improvements, and made in accordance with plans furnished by John Reid (London) Ltd.

The owners were represented on the trials by Mr. John Dunlop (Messrs. John Reid (London) Ltd.) and the builders of the vessel and machinery by Mr. R. Giles (yard manager), Mr. J. W. Gibbeson and Mr. T. H. Matthews (manager M.E.D.)

The Port of Rotterdam.

Progress of Docks Extension Scheme.

The gradual increase of the traffic in the Port of Rotterdam, which is now surpassing pre-war figures, may be illustrated by the following data:—

	Imports in Tons (a).	Exports in Tons.	Totals.
1913	22,061,026	7,358,456	29,419,482
1925	17,044,710	12,456,779	29,501,489
1926	15,409,533	22,541,279	37,950,812
1927	23,796,421	17,547,798	41,344,219

	Number of Sea-going Vessels which entered the Harbour.	Total Net Tonnage.
1913	10,527	13,047,465
1925	11,124	16,864,105
1926	14,511	21,495,835 (b)
1927	13,130	21,393,207

Pier Foundations for the Koninginnebrug, now under construction at Rotterdam.

The increase of the traffic mentioned above, made it necessary to proceed on the extension of the port, which had almost been stopped in the period 1923-1926.

The chief points, which must be noted in this respect, are the deepening of the Waalhaven, the construction of the "Three Docks Scheme" and the improvement of the cross-river-communication.

WAALHAVEN.

The Waalhaven, situated on the left bank of the River Maas, is specially intended for the handling of bulk cargoes; the transhipment of coal and ore either takes place at the quay-side and is performed by gigantic bridge-cranes, or at the buoys and dolphins by floating cranes.

In the course of 1926 three more bridge-cranes were installed giving a total of 23 of these cranes. In the course of 1927 a new basin was dredged, sufficient for the accommodation of eight large ships at buoys. For this basin, which required an area of about forty acres and depth of 33 ft. below low water level, 2,100,000 cubic yards material have been removed.

The works now in course of construction, and which must be finished in the fall of 1929, will provide for an area of about 225 acres of water with a depth of 23 ft. below low water, sufficient for forty more ships of a smaller type.

THREE DOCKS SCHEME.

The three docks belonging to this scheme, which will have one entrance, are mainly intended for vessels carrying general cargo.

Part of this dock entrance had already been dredged in the years 1923 and 1924. In the fall of 1927 this work was again taken in hand. The construction programme for 1928 and 1929 comprises 6,000 ft. of quay wall for a depth of water of 40 ft. below low water level and 2,000 ft. of quay wall for a depth of water of 23 ft. Including the docks entrance the area of water will by that time be about 75 acres.

For all quay wall construction in Rotterdam an amelioration of the soil is executed. By dredging away the soft strata, a large furrow is formed with a bottom width of about 100 ft. at 60 ft. below low water level; this furrow is filled with coarse sand.

This method of working, which has proved satisfactory through the last forty years, increases greatly the amount of dredging work which has to be performed, but is necessary on account of the very soft sub-soil.

In this case over 5,000,000 cubic yards will have to be dredged, and the quantity of sand required for the amelioration and raising of the sites amounts to 4,000,000 cubic yards.

The dredging is now executed at a rate of 100,000 cubic yards a week. The dredged materials are pumped ashore to sites surrounding a lake known as Kralingsche Plas. The sites, which have already partly been raised over 20 ft., will be utilized for the lay-out of a wood and park.

CROSS RIVER CONNECTION.

In 1927 a second service for vehicular traffic was added to the many ferry services crossing the river. A great improvement has been obtained in the bridge connection.

This connection consists of a railway bridge on a high level with a fixed part over the river Maas and a movable part over the Koningshaven, and a lower bridge for vehicular traffic, also with a fixed part over the river Maas, called Willemsbrug, and a movable part over the Koningshaven, known as Koninginnebrug. This Willemsbrug, which in 1924-1925 had already been strengthened and widened, has now been raised over 7 ft. A great many ships, which formerly had to pass through the Koningshaven, can now pass under the fixed bridges crossing the river Maas.

It is unnecessary to add that this means a great improvement for traffic by water and by land.

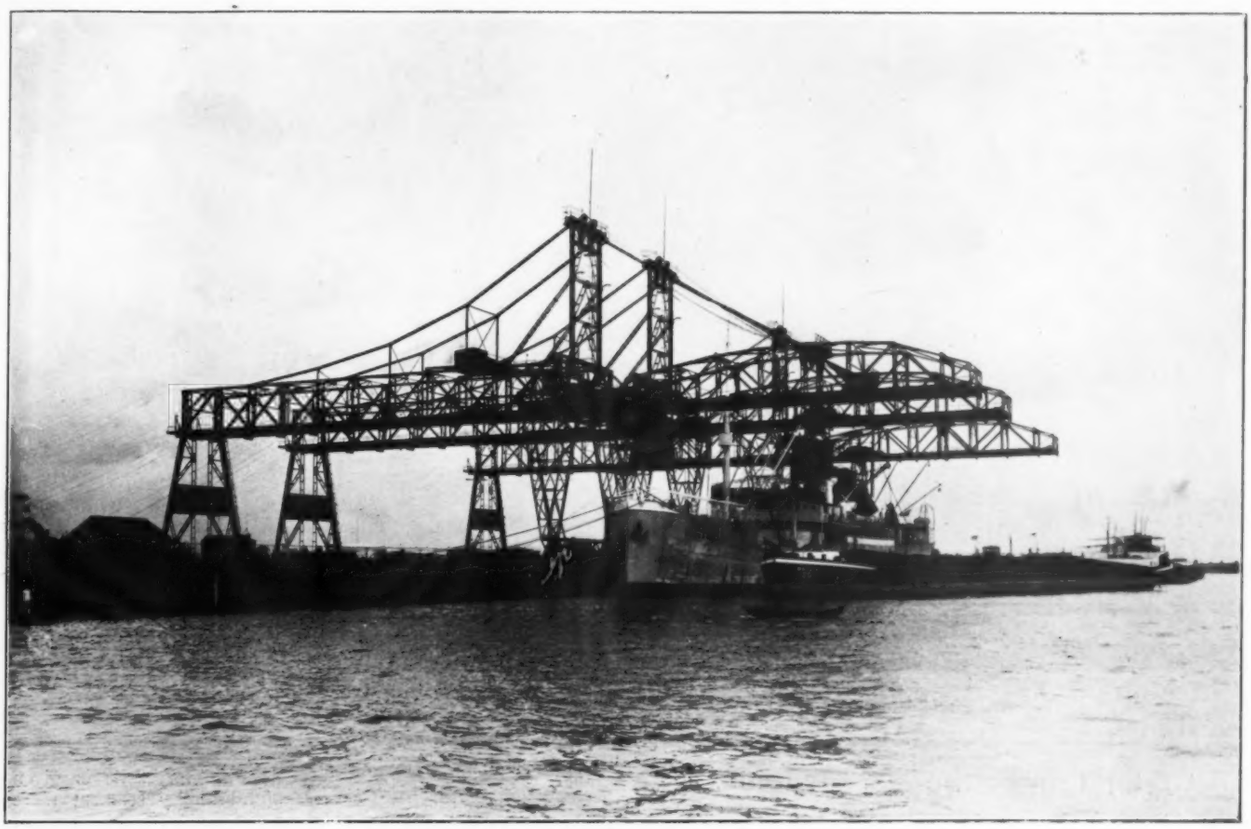
The movable bridges crossing the Koningshaven were both swing bridges giving two openings, each 66 ft. wide. The railway bridge has already been displaced by a vertical lift bridge with one opening 165 ft. wide. The swing bridge for vehicular traffic will be substituted by a double bascule bridge, having the same through passage. The foundations for this new bridge are now under construction.

From these details it may be seen that Rotterdam is doing its bit in the general rush for docks extension in the West-European Ports.

(a) Tons of 1,000 K.G.

(b) The abnormal growth of the export in 1926 is almost entirely due to the coal strike in England, which influenced greatly the shipment of German coal from Rotterdam.

The Port of Rotterdam.



Newly-erected Bridge Cranes on the North Side of the Waalhaven at Rotterdam.

Vertical Lift Bridge over the Koningshaven, Rotterdam.

Dredging in progress at the Merwehaven, at the Dutch Port of Rotterdam.

Trial Trip of the S.S. "Oltenia."

Oil Tanker built on Bracketless System.

The " ss. Oltenia," an oil tank steamship constructed by Sir W. G. Armstrong, Whitworth and Co., Ltd., at their Low Walker Yard, Newcastle-on-Tyne, to the order of the Steua Romana Societate Amonium pentru Industria Petroleului, Bucharest (The National Oil Company of Rumania), has just concluded a very successful trial trip off the River Tyne.

The "Oltenia" is the 153rd tanker built by Armstrong, Whitworth and Co., Ltd., but is the first vessel of Isherwood's latest " Bracketless " type to be constructed by them.

The " Oltenia," being the latest of the vessels, her design and arrangement are the results of careful study of the experience gained from earlier ships. She is a single-screw vessel, 436 ft. overall by 55 ft. beam, designed to carry over 9,400 tons D.W. on about 25 ft. 6 in. draught, and has been built to attain the highest class in Lloyd's Register. She is fitted with a single-screw quadruple steam engine developing 3,300 I.H.P., taking steam from three boilers at a pressure of 220-lbs. per sq. in. fitted for burning oil fuel in conjunction with forced draught. The vessel attained a speed of twelve knots in fully loaded trim.

Superheaters are fitted to the main boilers, and there is one donkey boiler fitted for a working pressure of 120-lbs. per sq. in. The installation of auxiliary machinery is particularly complete in this vessel.

Her cargo of oil will be carried in eighteen cargo tanks and ten summer tanks. In addition, the oil fuel for the engines is carried in cross bunkers and in the fore deep and settling tanks. The oil cargo will be worked by three pumps in one pump room, the two large pumps being capable of pumping about 500 tons of cargo per hour working together. Water ballast is also carried in the fore and after peaks and in the double bottom.

Ae regards arrangements generally the " Oltenia " is one of the most perfect specimens of her type, and is specially designed for the Rumanian oil export trade. The engines are placed aft, with accommodation for the engineer officers and all engine room ratings close to the engine room, where there are mess rooms for their use. The captain's accommodation and owners' rooms are in a house on the upper bridge, with a wireless telegraph office, and a stateroom for the wireless operator, and above are the wheelhouse and the chart and direction finder room. On the bridge deck amidships, the other deck officers have their rooms in a house, together with an extra large dining saloon, there being in the same house a spare stateroom. The dining saloon has its walls done in polished mahogany with floor laid in parquetry, whilst the furniture is of polished mahogany. The staterooms are painted white, with mahogany furniture. In the forecastle is given accommodation for petty officers and ordinary seamen, there being separate rooms for able seamen and ordinary seamen. Throughout, particular attention has been paid to the comfort of all on board, and ample storage accommodation has been provided, together with refrigerating machinery. Direction finder and helm indicator and electric log register are fitted. The galley range is oil-fired on Swinney Brothers' system.

The auxiliary machinery for working the ship includes a steam windlass, steering gear with telemotor control, and three steam winches. For the safety of the crew there are provided a wireless installation comprising up-to-date valve and spark transmitters and receivers, four lifeboats, etc., etc., whilst the fire-extinguishing appliances are of the latest pattern.

Her crew will consist entirely of Rumanian subjects, as is the case with the other vessels of this Company's fleet. On the trial trip the owners were represented by Mr. Percy Anderson, managing director of Messrs. Steaua Romana (British) Ltd., and Mr. H. C. Fairbank, their superintendent engineer. Also present were Mr. J. J. McKenzie, superintendent engineer, and Captain McGann, marine superintendent, both representing the British Tanker Company, Ltd. The Rumanian Consul was also on board.

SHIPYARD CHANGES HANDS.

In order to cope with increasing shipbuilding business, Sir W. G. Armstrong, Whitworth and Co., Ltd, have purchased the old-established shipyard of Messrs. Dobson and Company, which adjoins their Walker Shipyard, Newcastle-upon-Tyne.

AERIAL SURVEY OF RIO.

Two seaplanes, which will be used in the first official aerial survey of the City of Rio de Janeiro and District, left London in charge of a pilot by the Blue Star Liner " Arandora," on June 6th.

The contract for the survey, which will begin immediately after the " Arandora " docks at Rio, has been secured, in face of keen international competition, by the Aircraft Operating Company of London, and the machines to be used will be a Vickers-Vendace seaplane with a 330 h.p. Nimbus engine and a D.H. Moth of approximately 60 h.p.

The aerial survey of Rio and district will cover an area of 450 square miles. The cameras are specially designed for oblique and vertical photography. The degree of accuracy required can be gauged from the fact that the maps will show such precise details as doorsteps and windows of houses.

The expedition will be under the charge of Colonel T. T. Behrens, formerly of the Royal Engineers. Colonel Behrens will be assisted by an expert staff of fourteen European surveyors, photographers, mechanics and pilots, who sailed for Rio in the Blue Star Liner, " Avila," on May 23rd. It is hoped to complete the photographic part of the survey in about eight months.

North-East Coast Ports.

The value of the improvements that have been made in the facilities for coal shipments on the North-East Coast have been proved conclusively during the last week or two. There is no doubt that in the past the relatively slow loading of vessels has hampered trade, but the details appended show that at present the staiths have been working remarkably well. There are two records to be made of really smart loading. One achievement was made at Tyne Dock, where 554 tons were shipped per hour. The s.s. " Burnhope " entered the dock at 4.34 a.m. on May 22nd. The vessel was berthed at 6 a.m., and ten minutes later work commenced. By 2.50 p.m. the work was completed, the vessel having been in berth eight hours forty minutes. Of this time, however, twenty minutes were taken up by meals and one hour and ten minutes in getting rid of water ballast. As a matter of fact, loading was carried out in six and three-quarter hours, during which period no less than 3,740 tons of cargo were shipped, working out at the average above named. In twelve hours and five minutes after entering, the vessel left the dock.

The other instance of quick loading comes from Blyth, and was effected at the new staiths, a description of which was recently given. The vessel was the " Nutfield " and, commencing loading at 6.15 a.m., it finished at 9.55 a.m., having taken aboard in that time 2,102 tons, together with 54 tons of bunkers. This worked out at an average of 588 tons per hour, a notable illustration of the capabilities of the new loading facilities.

TYNE IMPROVEMENT COMMISSION.

The Tyne Improvement Commissioners, in conjunction with the B. and N. Line Royal Mail steamships, have built a new riverside railway station and quay at the Albert Edward Dock to facilitate the handling of passengers, mails and cargo between England and Norway. The B. and N. Line run regular passenger, mail and cargo steamers three times weekly from the Tyne to Bergen. This is the shortest sea route to Norway and the quickest route to the Norwegian capital (Oslo), as well as to all the holiday districts. The London and North-Eastern Railway Co. are co-operating with them, a special boat train leaving the Central Station, Newcastle-on-Tyne, for the quay in connection with each sailing. Through carriages and special trains will be run from London to this riverside station, which will be known as Tyne Commission Quay Station.

The question of the utilisation of Jarrow Slake on the Tyne is again being raised. The question is a sort of hardy perennial, for it is periodically arising. At one time it was proposed to reclaim what is now practically a watery waste, and have an immense floating dock installed, but this, like many other schemes, fell through. Now the London and North-Eastern Railway are interesting themselves in the matter, and a conference was held recently between Sir William Noble, chairman of the Tyne Improvement Commission, and officials of the authority, with Mr. W. Whitelaw, chairman, Viscount Grey, Sir Ralph Wedgwood, and other chiefs of the London and North-Eastern Railway, on the subject of development. It was understood that the underlying idea was the utilisation of the water space so that, in course of time, it could be made to accommodate the largest vessels at any state of the tide and to provide for the quick loading and despatch of cargoes.

GATESHEAD QUAY.

An interesting development of Gateshead Quay is about to be made, for the Town Council have decided to lease the remaining portion of the quay to the Tyne-Tees Shipping Co. for 21 years. For a long time the quay was almost useless, but then the Tyne-Tees Co. leased a portion, and the present proposal is for them to take in the remaining portion. It was explained that the Tyne-Tees Co. were prepared to erect at their own expense the necessary sheds and to carry out the dredging required to make the berth suitable for the vessels they propose to bring. The Company also agreed to encourage other vessels to utilise the berth.

After thirty years' close and active association with the Tyne Improvement Commission, Sir Alfred M. Palmer, who was a coal-owners' representative on the authority, has resigned. He was for three years chairman of that body, and was a general favourite. It was resolved to place on record an expression of the Board's regret at Sir Alfred's retirement, and an appreciation of his many good qualities. It was announced that Sir Arthur Nicholas Lindsay Wood, Bart., had been elected by the coal-owners to fill the vacancy.

The Tyne Commissioners' last trade return showed decreases all round. The fuel shipments for the four months of the year were 5,067,228 tons, a decrease of 422,239 tons compared with last year, or 7.69 per cent., and 1,381,057 tons, or 21.42 per cent. compared with 1913. In regard to general merchandise the figures for April, the latest obtainable, showed a decrease of 14.18 per cent., and for the four months of the year 4.81 per cent.

TEES CONSERVANCY.

One of the best known figures in the domain of docks and harbours in the district is Mr. J. H. Amos, who has been general manager for the past 41 years for the Tees Conservancy Commission. As an expression of their high appreciation of his abilities the members of the Commission have had his portrait painted in oils by Mr. Fiddes Watts, R.S.A., and it was recently unveiled by Sir Hugh Bell, the veteran ironmaster, who took the opportunity of emphasising the great value of the services rendered by Mr. Amos to the Commission.

At the same time Mr. Amos was presented with a replica of the portrait for his own home. Mr. Amos has had a varied experience, for he began his business life with the old North-Eastern Railway Co. in the goods depot at Newcastle. Thence he entered the service of the Newcastle Corporation as manager of the quayside estates. In 1887 he left the Tyne for the Tees, being appointed secretary to the Tees Conservancy.

West Coast Ports.

Improvements at Garston and Fleetwood.

GARSTON DOCKS.

To cope with the steadily increasing growth of business through the ports on the west coast of England and to allow for future expansion, the L.M.S. Railway are spending some £250,000 on a scheme to improve the Ports of Garston and Fleetwood (Wyre Docks). Considerable alterations and improvements are being carried out at Garston Docks, necessitated by the large increase and change in character of the business.

The principal features of the scheme which has been authorised are:—Additional timber storage area of about 20 acres, with extra siding accommodation for 513 wagons; other accommodation is being provided for 170 addition wagons. Additional and improved siding accommodation at Park Sidings, North Dock, Stalbridge Dock, High Level (Dingle Section). Cranage Facilities at the port are being modernised and considerably increased; these include four seven-ton electric luffing grab cranes. Seven coal tips have been recently reconstructed to take 20-ton loads.

FLEETWOOD (WYRE DOCK).

Fleetwood now ranks fourth among the fishing ports of Great Britain and when the proposed scheme has been carried out it will be second to none in equipment and convenience.

Last year 1,600,000 boxes of fish averaging one cwt. per box, were landed at Fleetwood as compared with 900,000 in 1913. To give some idea of the amount of fish passing annually through the port, 80,000 tons of ice are used annually by the trawler owners and merchants. A local ice factory has an output of over 300 tons a day and storage accommodation is provided for 5,500 tons in the largest ice storage room in Great Britain. The year 1891, saw the first steam trawler operating from Fleetwood; to-day 200 spread their nets as far afield as Iceland; some 35,000 tons of coal are used for bunkering these vessels.

New slipways are already in course of construction and the further alterations which are being commenced immediately include:—Increasing the marketing space by 50 per cent. by extending the bays; widening of the fish dock entrance from 43 to 50 feet; provision of 16 additional storage lofts on an upper storey above the stage; improvements to rail facilities admitting of rapid discharge from the stage; provision of a new yard for storing boxes with connecting concrete truck ways and overhead conveyor; construction of a new berth for passenger traffic in a position central to the market; provision of two new fitting out berths in the Wyre Dock and the removal of the present berth from the Fish Dock, thus freeing space for the discharge of fish.

BELFAST STEAMERS.

With the transference of the Belfast passenger and mail service from Fleetwood to Heysham Harbour the berths formerly used by the Belfast steamers at Fleetwood are available for other vessels.

Consequent upon this transfer of mail steamers from Fleetwood to Heysham the L.M.S. have carried out considerable improvements at the latter port. Holyhead Harbour, Barrow and Grangemouth Docks have recently been equipped with modern loading and unloading appliances and schemes for improvements at other L.M.S. ports are under consideration. The improvements which have been carried out leave ample scope for future development.

Situated as they are on close proximity to the main industrial areas, this chain of modern ports, together with the connecting rail facilities affording direct transfer from ship to ship and vice versa, ensure the rapid transport service so essential to trade.

Notes from the North.

SUPER POWER STATION ON DOCK ESTATE.

To cost £1,680,500 as a first instalment, a new super power station is to be built on the site now occupied by Clarence Dock, Liverpool. Two 50,000 k.w. turbo alternators will be installed in the first place, but there is ample area for the erection of a station up to 320,000 k.w. with an adequate supply of circulating water from the River Mersey, without any excessively expensive or difficult civil engineering work; the connections with the railway lines over which the coal will be brought are good, and there is abundant space for coal storage. It is hoped it will be possible to have the first stage of the station on the dock site in operation for the load of the winter of 1930-31. The sanction of the Electricity Commissioners is now awaited by the Liverpool Corporation for the purchase from the Mersey Docks and Harbour Board of the site of Clarence Dock containing 52,273 square yards, or thereabouts, the land to be used for the sole purpose of erecting the generating station, including coal storage accommodation.

The purchase money will be paid as follows, viz:—£200,000 on the date of the signing of the contract; £100,000 five years after the date of the signing of the contract; and £100,000 ten years after the date of the signing of the contract.

The main conditions of the agreement are:—The Dock Board to allow the Corporation to construct a screening chamber for use in connection with the scheme on the site of the river entrance to the Clarence Half-Tide Dock, subject to the Corporation paying to the Board the sum of £1 per annum in respect of the privilege; the Corporation to carry out at their own expense all work in connection with the screening chamber, other than the outside river wall, including the provision of the necessary intake culvert from the screening chamber to the engine house and the discharging culvert from the engine house into the river; the Corporation to construct at their own expense a dock wall across the entrance to the Clarence Dock and to pay three-fourths of the cost of the erection by the Dock Board of the outside river wall at the river entrance to the Clarence Half-Tide Dock, such river wall to be maintained by and at the expense of the Dock Board; the screening chamber to be constructed and covered in such a manner as will enable the Board, if required, to construct a dock shed and roadway over the same; plans of the dock and river walls, the screening chamber, and the culverts to be submitted to, and approved by, the Dock Engineer before the work is put in hand, and the work to be carried out subject to such conditions as he may consider necessary and to his satisfaction. Upon completion the walls (except the river wall at the river entrance to the Clarence Half-Tide Dock), the screening chamber and culverts to be maintained by the Corporation at their own expense to the satisfaction of the Dock Engineer. The culverts to be laid at depths to be approved of by the Dock Engineer; the Corporation to bear the cost of and incidental to the running dry of the Clarence Half-Tide Dock in connection with the work of erecting the dock and river walls and of laying down the necessary culverts. The Dock Board at their own expense to dredge as far as may be practicable the Clarence Dock before it is run dry; the Corporation to obtain such consents (if any) as may be necessary from the Admiralty, Board of Trade or Ministry of Transport, prior to commencing any work below high water mark Spring Tides; the Corporation not to interfere with or obstruct traffic over the dock lines of railway. The Dock Board to provide reasonable facilities for the conveyance of coal, plant, machinery and materials required for the construction and working of the generating station; the Corporation to be allowed to erect and work a transporter between the Clarence Dock and the Trafalgar Dock; the Dock Board to grant to the Corporation the necessary rights of way by subway or otherwise for cables for conveying power to and from the station, also for water and other services, subject to the Corporation paying to the Board a nominal charge for the privilege and to such reasonable terms and conditions as it will be necessary to lay down to protect the Board's interests; the Dock Board to give to the Corporation the option to purchase the site of the Trafalgar Dock at the same price per square yard as that to be paid for the Clarence Dock site, the Corporation to give to the Dock Board at least two years' notice of their intention to exercise such option.

HISTORY OF CLARENCE DOCK.

The Clarence, one of Liverpool's central docks, being the fifth to the north of the landing stage, was constructed under an Act of 1825 by the great dock engineer, Jesse Hartley, and opened in 1830. For some years it has been used mainly by coasting steamers. The decision to erect a station alongside the river is a reversion to a former proposal. Otterspool was then contemplated, but that site was ultimately rejected because the water of the Mersey at that point was not suitable for condensing purposes. The river water abreast of the Clarence Dock is said to be sufficiently pure and free from sand for the purpose in view at low water. Eighty per cent. of the present electrical load is within a ten-mile radius of Clarence Docks.

NEW DOCK ENTRANCES.

Lord Derby is to visit Birkenhead on Saturday, 21st July, to open the new 80 ft. river entrance lock at the Alfred Dock, and many distinguished guests have been invited by the Mersey Docks and Harbour Board to witness the ceremony. Those guests will go on board the steamer "Sarpedon" at the south quay of Alfred Dock. The ship will go into the lock, breaking a ribbon placed across it. The existing 50 ft. and 30 ft. passages between Alfred Dock and the East Float along Tower Road will be replaced by the new entrance lock which has been constructed. The work was included in the Birkenhead docks extension scheme begun five years ago. The passage between the two docks has also been deepened by 6 ft. This will provide a depth of water at high water on the ordinary spring tides of 33 ft. 10 in., as compared with 27 ft. 10 in., and will permit of larger vessels using the Birkenhead Docks. The original heavy swing bridge over the lock between Alfred Dock and the East Float has been removed in sections to be replaced by a heavier bridge. The new bridge to span the lock will carry the two sides of the lock and maintain a roadway from Birkenhead to Seacombe and Wallasey. The bridge will weigh about 900 tons. This marks the completion of the first stage of improvements and will be of immediate benefit to the ships of the Bibby, Holt, and City Lines, which trade between Mersey and India and Far Eastern ports. The project in its entirety will cost well over £1,000,000. This outlay has been undertaken by the Dock Board in order to cope with the conditions created by the growth in tonnage of the vessels engaged in the Eastern trade. These larger ships call for deeper docks and wider entrances, and the Board are providing them. The laying of the sill of the new lock at a depth of about 12 ft. below the bay datum means that all East-bound vessels using the Suez Canal can be loaded to full capacity before leaving Birkenhead. The Albert is, of course, the vestibule dock for the whole of the Birkenhead system.

ACHIEVING THE QUICK TURN-ROUND.

A remarkable example of quick discharge and re-loading of an Atlantic liner was recently furnished in connection with the Canadian Pacific steamer "Minnedosa." The vessel arrived at Liverpool on the Saturday morning from Canada. Having disembarked her passengers in the Sandon Dock, she started to unload cargo. By ten o'clock that night she had discharged 2,800 tons of cargo and put on board 1,000 tons of coal. She left the Sandon Dock by the tide early on Sunday morning for Glasgow. In the Clyde she discharged a further 800 tons of cargo and took on board 1,400 tons of coal and 800 tons of new cargo. On Tuesday she sailed from the Clyde for Canada. This obviously smart performance in the way of "turning round" a big Atlantic liner is a tribute to the efficiency of the system of handling the vessel as well as to the excellent work of the dockers and other quayside staff.

REDUCED DOCK RATES.

Reduced dock rates and town dues on tapioca have been introduced by the Mersey Docks and Harbour Board, viz.: inward, foreign dock rates and town dues, 5s. 4d. per ton; outward, foreign dock rates and town dues, 2s. 8d. per ton; inward, coastwise town dues, 1s. 8d. per ton (unaltered); outward, coastwise town dues, 1s. 4d. per ton, all less 5 per cent. The Board has also directed that the inward coastwise town dues on sago be reduced from 3s. 4d., less 5 per cent. per ton, to 1s. 8d. less 5 per cent. per ton.

DEATH OF DOCK BOARD ASTRONOMER.

Mr. William Edward Plummer, director of Liverpool Observatory, at Bidston, Birkenhead, who passed away in his 80th year, was astronomer to the Mersey Docks and Harbour Board and had been Hon. Reader in Astronomy at the University of Liverpool since 1900. After taking his M.A. degree at Oxford he entered the Royal Observatory at Greenwich, subsequently assisting Dr. J. R. Hind at Twickenham. His eldest son, Mr. Henry Crozier Plummer, is professor of mathematics in the Artillery College, Woolwich, and was formerly Royal Astronomer of Ireland.

A SALVAGE JOB.

The Mersey Docks and Harbour Board recently raised from Canada Branch Dock No. 2 the steam derrick flat Alice, owned by Messrs. Wadsworth and Company, which foundered and sunk. No one was on board when the boat went down. The "Alice" has a huge derrick, and, when she canted over in sinking, the derrick struck and damaged the overhead railway rails. There was no cargo on board.

DOCK TRAFFIC.

In the statistical summary issued by the Mersey Docks and Harbour Board, relating to the disposal of foreign import cargoes at Liverpool and Birkenhead during the month of April, the most interesting point to be observed is the decline in tonnage conveyed by road motor to outside districts. Whereas in the month of March the total was 35,241, the total for April was 28,288 tons, a drop of approximately 25 per cent. On the other hand, there has been an increase of about 9,000 tons in rail-borne traffic. There will be some speculation

as to the reasons for these variations, but the explanation, the writer ventures to assert, is to be found in the fact that a few weeks ago the railway companies decided to make a cut in the cotton rate with a view to recovering the traffic which had been lost to motor haulage contractors. Apparently the loss of traffic is serious, and a manifestation has been the keen quotation of tonnage rates by transport contractors. During the month of April 577,474 tons of foreign import cargoes were cleared from Liverpool, details being:—By cart, lorry or motor lorry, 302,200 tons; by road motor transport to outside districts, 28,288 tons; by overside delivery (grain), 154,590 tons; other cargo, 29,175 tons; by flat and barge ex quay, 12,711; by railway wagons loaded on dock estate, 30,520 tons; bulk molasses pumped direct, 19,990. The distribution of traffic was as follows:—To local warehouses, factories and mills, 440,762 tons (percentage of total 76.3); to railway stations 48,931 (8.5); to foreign and coastal berths 20,338 (3.5); to canal depots 2,365 (0.4); to canals and Upper Mersey, 21,719 (3.8); to barges, 340 (0.1); to other destinations, 43,019 (7.4); total, 577,474 tons.

NEW DOCK BOARD ENGINEER.

Mr. Thomas L. Norfolk, for seven years principal assistant to the Engineer-in-Chief (Mr. T. M. Newall), has been appointed Engineer-in-Chief of the Mersey Docks and Harbour Board as from July 2nd. Speaking at the meeting of the Board, at which the appointment was made, Mr. H. B. Gordon Warren (chairman of the Works Committee) said a considerable number of applications for the post was received, and the Works Committee appointed a sub-committee to deal with the full list. A shorter list was then considered by the Works Committee, and a selection of candidates was made, so that they might be interviewed. It was the unanimous opinion of the Works Committee that Mr. Norfolk was the most suitable candidate, as his training and experience were somewhat exceptional. Mr. Norfolk first began as a pupil to a mechanical engineer, and he spent eight years in the works as engineering draughtsman. He then went to sea for one year as a marine engineer, and afterwards became a pupil for three years to the well-known civil engineer, the late Mr. Bohn. On completing his three years' pupilage he became resident engineer, for two years, to the Sunk Island River Training Banks Reclamation Scheme on the River Humber. That completed his training pupilage as a civil engineer. Then for ten years he was on the dock engineer's staff of the North-Eastern Railway, for the last five years of which period he was principal assistant to the joint engineers for the construction of the King George Dock at Hull. In 1914 he entered the Mersey Dock Board's service, and six years later became principal assistant to the Engineer-in-Chief. Members of the Board would notice that Mr. Norfolk always stepped down to step up. He was principal assistant at Hull and then became second assistant at Liverpool. Mr. Newall, the retiring engineer, had found him a very valuable lieutenant in the construction of the Gladstone Dock. He had been engaged in the Board's service continuously for the last fourteen years, and he had had 24 years' experience in dock construction and maintenance in Hull, Hartlepool, Middlesbrough, Tyne Dock (Newcastle), and Liverpool. He is a member of the Institution of Civil Engineers and of the Institution of Mechanical Engineers, and is an associate member of the Institute of Electrical Engineers. The salary of Mr. Norfolk will, it is believed, be in the region of £4,000 a year. His predecessor's, on appointment in 1913, was £3,500.

ELLESMERE PORT IMPROVEMENTS.

Improved facilities for oil traffic have been provided at Ellesmere Port, where the new developments include dock extension, transit sheds, and the most up-to-date coaling plant, which Sir Alfred Mond praised in an address to the Institute of Fuel when he congratulated the Manchester Ship Canal Company's chief engineer on having devised a system for loading coal into ships with the minimum of breakage. The coal trucks are automatically discharged into tips, whence the coal is conveyed by electrically driven bands for the run to the transit sheds and along radial and telescopic arms direct to the ship. The movements of the telescopic arms result in the coal loading being concentrated on the point desired, and their mobility practically cuts out trimming. Ellesmere Port is destined to become still more valuable to the Manchester Ship Canal. Its eastern extremity, Stanlow, is rapidly forging to the front as a centre for the discharge of imported spirit. At Stanlow the low flash point oils are discharged, and elaborate means have been taken for their handling and storage. Most of the big oil companies have storage distillation plants.

TO ATTRACT MORE TIMBER TRAFFIC.

The Liverpool Timber Trade Association has been consulted by the Mersey Docks and Harbour Board in connection with an important scheme for the provision of facilities for discharging timber direct from the ship into railway wagons, and for an extension of the railway storage grounds of the port. Negotiations at the time of writing are merely in the early stages of informal conversation, but it is hoped they will yield some result in the vital process of cheapening the Port of Liverpool and restoring much of the trade that has been lost in recent years.

MORE CRANES FOR CARRIERS DOCK.

To make Liverpool a port at which timber may be handled on a basis that would be competitive with places like Garston and Preston, to say nothing of Manchester, the Mersey Docks and Harbour Board proposes to erect cranes at the Carriers Dock, and to lay rails there and on the Regent Road timber ground. The scheme which the Board has in mind indicates that they will be prepared to receive softwoods ex ship, haul to storage ground, pile and deliver at an inclusive charge, and, in fact, act as warehousemen. For this purpose they would utilise Muspratt's Land, of which they had a large area in reserve, and would procure an ample supply of railway wagons. A scheme of this character is revolutionary so far as the timber trade of Liverpool is concerned. Hitherto, Liverpool has been at a decided disadvantage in regard to this traffic, in view of the Manchester Ship Canal Company's set charges.

NEW DOCK FACILITIES.

When members of the Institute of Transport visited Gladstone Dock, Liverpool, during Congress, they were interested to observe the preparations being made for the reception of Australian steamers. The finishing touches were being applied to a new single-storey shed to be used exclusively for this traffic, whilst the foundations were being laid for another shed on the adjoining side of the dock. It is interesting to learn that the Transport Committee of the Chamber of Commerce is now engaged in collecting information on the question of direct shipments from new Zealand and Australia to Liverpool, and when sufficient data has been collected it is proposed to call a conferenec of those particularly interested, so that the work of Colonel Hawkins (who acted as emissary of Liverpool in Australia), and the Mersey Docks and Harbour Board, might be supplemented by appropriate efforts to increase the number of sailings to and from the Port of Liverpool. Had space permitted, the writer would have referred to some of the new works that are proceeding at Gladstone Dock, including the plant employed for pile driving, concrete mixers and distributors, cranes and transport facilities generally.

RATING OF DOCK ESTATE.

A joint committee of representatives of the Mersey Dock Board and the Liverpool Assessment Committee appointed to negotiate the assessment of the Mersey Docks Estate in Liverpool, has come to an agreement whereby expensive litigation and legal expenses will be avoided. The Committee has fixed the assessment at a figure between £530,000 and £550,000. The Assessment Committee fixed the assessment at first at a higher figure, which was resisted by the Board on the ground that it was too excessive. When the new Rating and Valuation (Apportionment) Bill becomes operative the Mersey Dock Estate will obtain some relief from the heavy burden of local taxation. Warehouses on the Dock Estate will be benefited, but those on the landward side of the overhead railway will not. The question is receiving attention in Liverpool commercial circles, and the probability is that there will be an agitation for equal treatment.

FLEETWOOD SEA DEFENCES.

The first part of the sea defence wall at Fleetwood, which has been a source of anxiety for about a quarter of a century, has been completed. The wall is a solidly built structure of mass concrete, and extends for 950 yards over that portion of the foreshore over which the sea has always made its first attack on the town. The foundation is about 8 ft. thick, and the wall has a maximum thickness of 6 ft. 6 in., tapering to 3 ft. 6 in. at the tip. It is now ready for the bull-nose coping and reinforced concrete promenade behind, which will afford additional stability. From the foundations to the top the wall varies in height from 10 ft. 6 in. to 14 ft. 6 in. and is capable of withstanding a tide of 38 ft., which is 5 ft. 6 in. higher than the abnormal tide which caused such devastation in October last. During the summer the extension of the wall northwards and southwards will be pushed on, and the construction of groynes on the foreshore to build up the beach to its former level will be pursued vigorously. When completed in its entirety the wall will stretch a distance of 1,900 yards, extending from the old sea wall at Rossall School to the War Department's land at the Rifle Range. The total cost of the wall, estimated at £55,000, is being borne jointly by the Fleetwood Council and the Fleetwood Estate Company in the ratio of two-fifths and three-fifths respectively. Messrs. Lewis and Lewis, consulting engineers, of Westminster, were responsible for the design.

A SINGULAR MISHAP.

The large modern dredger "Gilbertson," built at Preston, which the Workington Dock and Harbour Board purchased for the purpose of dredging the turning basin outside the Prince of Wales Dock, was the victim of a singular mishap in Workington Harbour recently. While working at the river mouth, near the quayside, she apparently struck some large

obstacle in the river bed, thought to be a rock. The plating was ripped and she began to fill rapidly. The two hoppers into which the refuse brought up is being transferred, were on either side of the vessel, and they were requisitioned in an attempt to keep the vessel afloat. Although this proved impossible, it is probably due to their use that the engineer had sufficient time in which to rake out the boiler fires before the water reached them. Had he not been able to do so, an explosion would have occurred, which would probably have made the "Gilbertson" a total loss. The men on board were taken off on the hoppers, and the dredger sank in the river bed within a few minutes. Fortunately it is lying near to the quay, and the path for shipping into the harbour is clear. At high tide only about four feet of its funnels are above water.

FLEETWOOD IMPROVEMENT SCHEME.

The £100,000 dock extension scheme at Fleetwood has been sanctioned by the London, Midland and Scottish Railway Company, and it is expected that work will be commenced on the work any day. The scheme provides for the entire widening and lengthening of the fish stages from the water's edge to the rear, the removal of all the fish merchants' offices to a storey higher, thus clearing a great obstruction from the fish stages, and the provision of extra berthing accommodation for steam trawlers, which will allow 50 per cent. more steamers to land catches at the same time. The scheme will enormously increase the facilities for landing and handling of fish cargoes as they arrive at the port. Only the barest details of the provisions of the scheme are at present available, but it is understood that the scheme which has been prepared with the co-operation of the trawler owners and fish merchants, includes the development of the east side of the docks, which, at present, is mainly used for coaling purposes. Three sides of the docks are used for berths for vessels to land their fish, and when the other side is ready there will be room in the docks for a considerably larger number of vessels.

GRAVEL FOR BROMBOROUGH DOCK.

With the object of inspecting the Company's plant at Point of Ayr, where gravel is shipped for use in the construction of the new dock at Bromborough, a visit was made a few days ago to Ramsey, Isle of Man, by Mr. F. D. D'Arcy Cooper, the chairman of directors, and other officials of Messrs. Lever Bros., Ltd. A large loading jetty has been built at the Point of Ayr, and already thousands of tons of gravel have been shipped.

FERRY TO CLOSE.

Wallasey Corporation has decided to close Egremont Ferry during the winter months in order that the landing stage and bridge may be reconstructed. Meanwhile, in order to relieve the summer traffic pressure at Seacombe and to further popularise Egremont Ferry, it has been arranged, in conjunction with the Tramways Committee, to run a 20-minutes' service in connection with the boats between the Egremont Ferry approach and New Brighton.

FORESHORE DEVELOPMENT.

Wallasey Corporation has obtained Parliamentary powers for the construction of promenades and foreshore development, street widenings, and reconstruction and repair of existing pier, etc., at a total estimated cost of close upon £1,000,000. Under the Act an enormous amount of work will be necessary in Moreton and Leasowe, such as flood prevention works.

FLEETWOOD FISH DOCKS EXTENSION.

Official details of the £100,000 reconstruction and extension scheme to be carried out by the railway authorities at Fleetwood Fish Docks are now available. The scheme provides for the extension of the fish market along its entire length to a width of 105 ft., and the centre of the market, which at present is a single-storey structure, is to be rebuilt and made uniform with the rest of the shedding, so that the whole of the upper floor will be available for the storage and repair of fish boxes. Instead of the space now occupied for the loading of fish conveyed by passenger train, a special stage is to be constructed for that purpose. Overlooking the docks, on the upper floor, is to be constructed a suite of offices. By this alteration the accommodation for the berthing of trawlers and the marketing of fish will be increased by about 50 per cent. That portion of the ground floor which is now reserved for the sorting and packing of fish will be widened to the extent of 23 ft. along its entire length, making a total width when completed of 68 ft. On the side of the docks a 10 ft. way is to be reserved for the passage of trucks, and at the back of the market, near to the railway sidings, there will be a platform 12 ft. wide, divided by sliding doors into enclosures, for the loading of the fish into the railway vans. Stairways will ascend from the stages and platforms at intervals of 60 ft. to the traders' gallery. Extra metals will be laid down so that there will be three sidings alongside the platform, which will enable three fish trains to be loaded simultaneously. New concrete roadways of a special type will allow the use of big trucks, which will be able to carry 30 boxes at a time, and the electric box conveyor will be altered and extended to serve the new areas. The scheme which, when completed, will provide Fleetwood with one of the finest and most up-to-date fish docks in the country, also includes a new drainage system for the whole of the dock estate.

The present entrance to the fish docks basin is to be widened to 50 ft., making the towing and manoeuvring of the very biggest trawlers a simple matter. The additional metals to be laid at various points will speed up shunting operations, and these, together with the drainage work, will probably be the first part of the work to be undertaken. The reconstruction of the markets will be done in sections, so as not to interfere with the business, and the whole should be completed at the end of next year.

Belfast Harbour Board.

At a meeting of the Belfast Harbour Board it was reported that a letter had been received from the Ministry of Labour approving the following works as schemes for the relief of unemployment: (1) The laying of a concrete track down the centre of the Northern section of the Donegal quay sheds, from the Clarendon Dock entrance to the South end of Albert Quay; (2) The laying of a concrete track (15 ft. in width) in Clarendon Graving Dock Yard, from No. 1 shed to the main gateway at Corporation Street, and along the North side of No. 2 Graving Dock, and (3) the improvement of the approach to Dee Street Bridge by the provision of two square-setted tracks, one on either side of the roadway, with a concrete track in the centre.

Mr. R. E. Herdman, D.L., the chairman, said the Board were undertaking certain works which were not absolutely necessary at the moment, but they wished to do their best to assist in the relief of unemployment.

Sir Thomas Wilson said that there was a desire on the part of many citizens that the Docks should remain open on Sundays, in order that people might enjoy a walk along them. He had told several persons who had spoken to him on the subject that the Board were always willing to give passes to respectable people, but they were not prepared to open the docks to everybody, because they were afraid that there might be pilfering, or that fires might be caused through carelessness. He took it that the Board were prepared to give passes.

The Chairman: You have the assurance of the general manager that no respectable person is ever refused a pass, and you are also no doubt aware that pilfering and other offences have been reduced to a very large extent since the docks were closed.

A communication from the Belfast Steamship Co., Ltd., stated that as the new steamers which they proposed to place on the Belfast—Liverpool service would be much larger than the present ones, it would be necessary to provide new fender piles in place of the existing ones at the Liverpool berth, Donegal Quay.

Reports from the Engineer and Harbour Master having been submitted, it was, on the motion of Sir Thomas Wilson, seconded by Mr. McCalla, recommended that the engineer be authorised to provide new fender piles, in such position as may be eventually arranged between the Board and the Belfast Steamship Co., Ltd.

The Chairman said they were indebted to Sir Robert Baird, one of the members of the Board, for a further gift of pictures of old steamers that did service in the past between Belfast and other ports as well as a photographic impression of Donegal Quay in 1923. They had accumulated quite a valuable collection of these pictorial souvenirs, and Sir Robert's gift would add greatly to their historic worth. These pictures, whilst interesting to-day would be still more interesting in the future.

Sir Robert Baird said he would always be glad to let the Commissioners have any photographs of interest relating to the port. Some pictures helped to link up the past and the present and gave an idea of their shipping development.

The latest report of the Belfast Harbourmaster shows that 383 vessels arrived at the port from 13th May to the 2nd June as follows:—

Coastwise and cross-Channel 351, foreign 23, non-trading 9. The total tonnage of vessels which arrived from the 1st January to the 2nd June was as follows:—Coastwise and cross-Channel 943,556, an increase of 36,650 over the corresponding period last year; foreign 232,928, a decrease of 45,707; non-trading 36,828, an increase of 14,719; total, 1,213,312, an increase of 5,662.

At a meeting of the Londonderry Harbour Board it was reported that during April six transatlantic steamers of a tonnage of 60,366 tons, 46 regular cross-Channel steamers (19,432), three foreign trade (3,951), forty-five coal laden (6,150), and 24 other vessels (2,449), a total of 124 vessels representing 92,339 tons arrived at the port as against six trans-atlantic (58,546), thirty-two cross-channel (14,132), seven foreign (11,526), thirty-nine coal (6,169), and seven other vessels (804), a total of 91 vessels representing 91,227 tons for the same period in 1927.